Radiation and Sonics

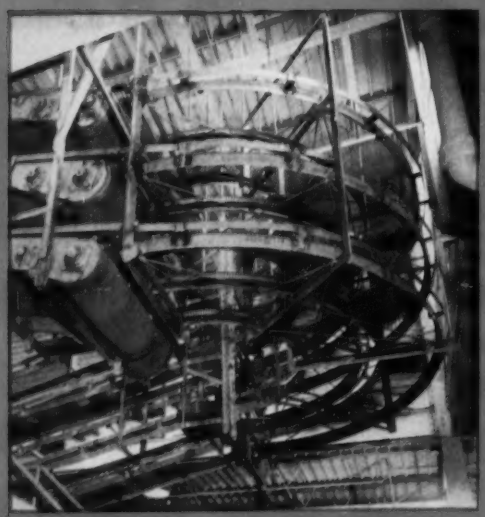
MAY 1955

35 CENTS

FOOD ENGINEERING

A McGRAW-HILL PUBLICATION

ENGINEERING • Milk process wins FE Award as outstanding advance. p. 61



MATERIALS HANDLING • Unusual bakery set-up keyed to conveyors. p. 94

INGREDIENTS • Better dehydrated onions produced in new continuous process. And batch bottlenecks are broken. p. 63

ALSO: PACKAGING • SANITATION • MAINTENANCE
TRANSPORTATION • PROCESSING • QUALITY CONTROL
INSTRUMENTS • PERSONNEL • PRODUCTS

. . . See Contents Classified by Subject, Page 3 ➡

INQUIRY COUPON INSIDE BACK COVER

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May 1955

Volume 27 Number 5

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FOOD ENGINEERING

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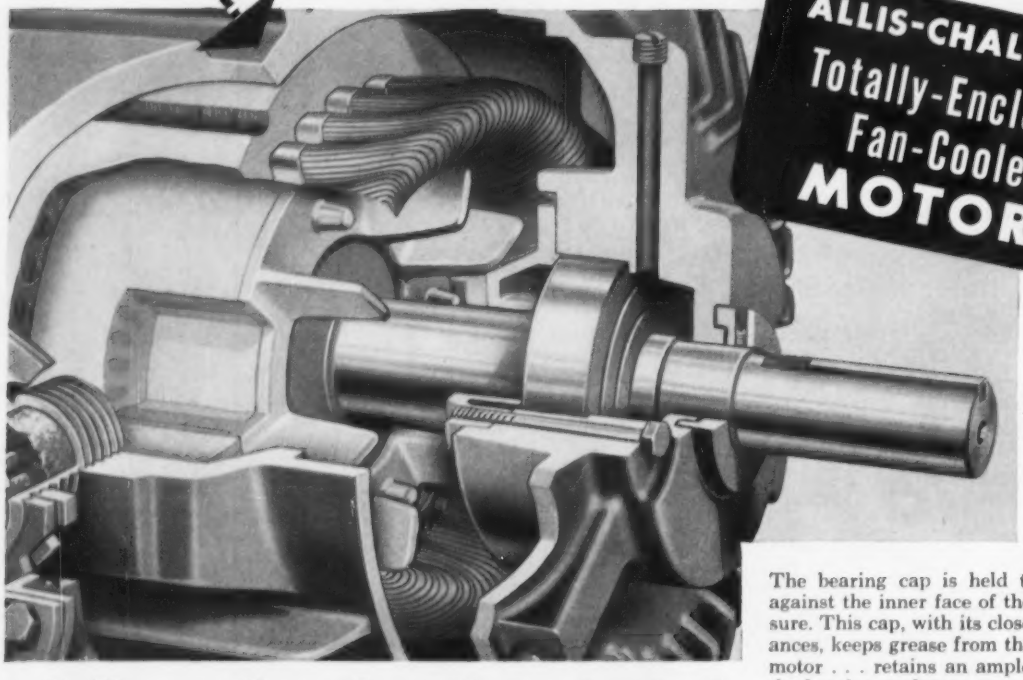
PRACTICAL IDEAS

Get Both
bearing features



fully enclosed and protected

The bearing cap is held tightly in place against the inner face of the bearing enclosure. This cap, with its close running clearances, keeps grease from the interior of the motor . . . retains an ample supply within the bearing enclosure.

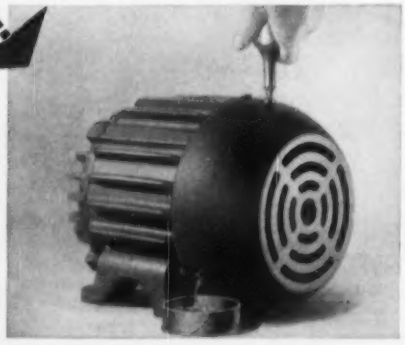
At the outer side of the bearing, double labyrinth seals keep grease in, also keep dirt out. What's more, large grease reservoirs act as additional dirt traps.

. . . yet easy to grease

You can lubricate the bearings without dismantling the motor. Pipe-tapped holes in the bearing housings at three points provide both means for inserting new grease and a means of flushing out old grease.

Look for the extra bolts on the end housing . . . the sign of greater value. Ask your Allis-Chalmers representative or Authorized Distributor to show you a cutaway section of this maintenance-cutting design. Or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 51B7225.

A-4609



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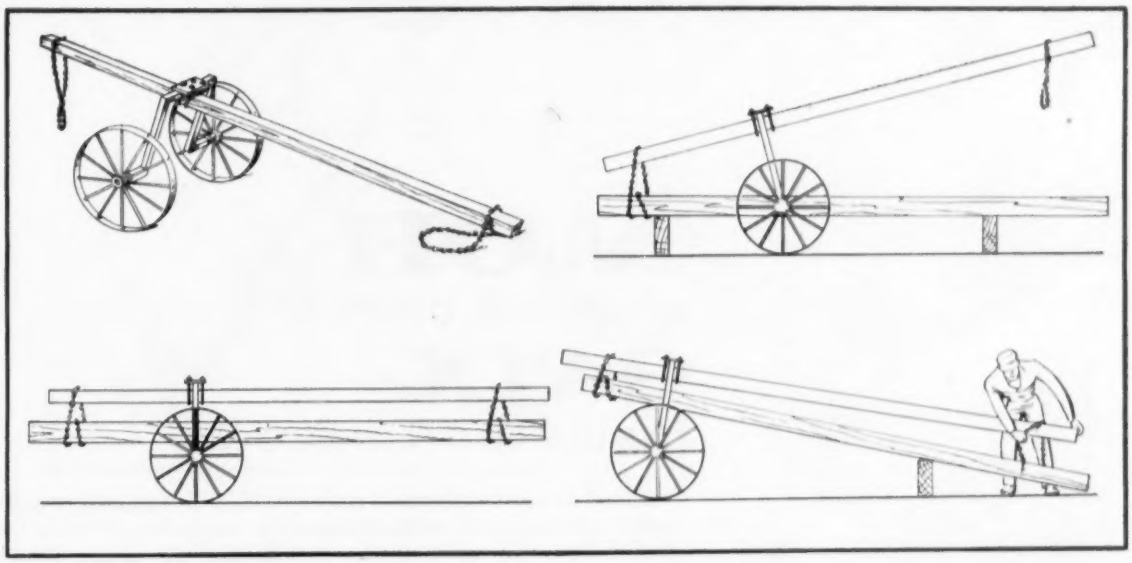
PRACTICAL IDEAS



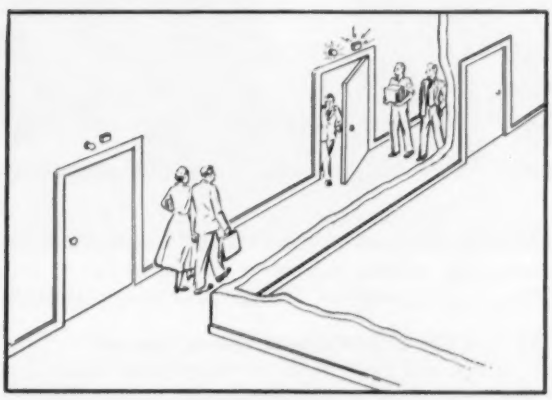
For Long Heavy Units

A convenient hand truck for transporting timbers, pipes and other long units can be made of two 36 in. diameter cart wheels connected by a metal yoke with an axle at each end and provided with a handle of metal or timber secured to the center of the yoke. The handle projects about four feet in front of the yoke and eight feet to the rear. A chain sling is provided at each end of the handle for attaching pipe.

To pick up a load, cart is run over the unit which has been blocked up to provide room for passing the chain under it. The handle is tilted so that the forward end is down on top of the load. In this position the chain on the short end is wrapped around the load and secured with a grab hook. The rear end of the handle is then brought down by manpower raising the front end and part of the load. The rear end is then secured to the load with a second chain. Then the handle is raised to a horizontal position to permit load to be wheeled to destination.

Loads can be balanced by shifting the position of the chains. Small short pieces of material can be carried by fastening them to the forward chain only.

Though most of material handling is now accomplished with use of industrial truck, there are still jobs of moving for short distances or to inaccessible location where this rig can be used to advantage.—*M. J. Hess, 545 N. Washington St., Hinsdale, Illinois*



Passage Way Safety Control Device

Doors that open onto aisles invite accidents, unless traffic along the passage-way is warned of any sudden opening of a door. A simple device will provide this automatic warning.

All that is necessary is to install a reverse contact switch between the door and the frame on the hinged side so that when the door opens contact will be made in the switch. Now wire the switch to a light—a red light may be preferable—or to a buzzer, bell, or other noise-maker (see sketch).

Now, as the door starts to open into the aisle or passage-way to thereby become a potential source of injury to traffic, the bulb lights and the buzzer sounds, providing ample warning.—*F. E. Staff*

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(Formerly Food Industries)

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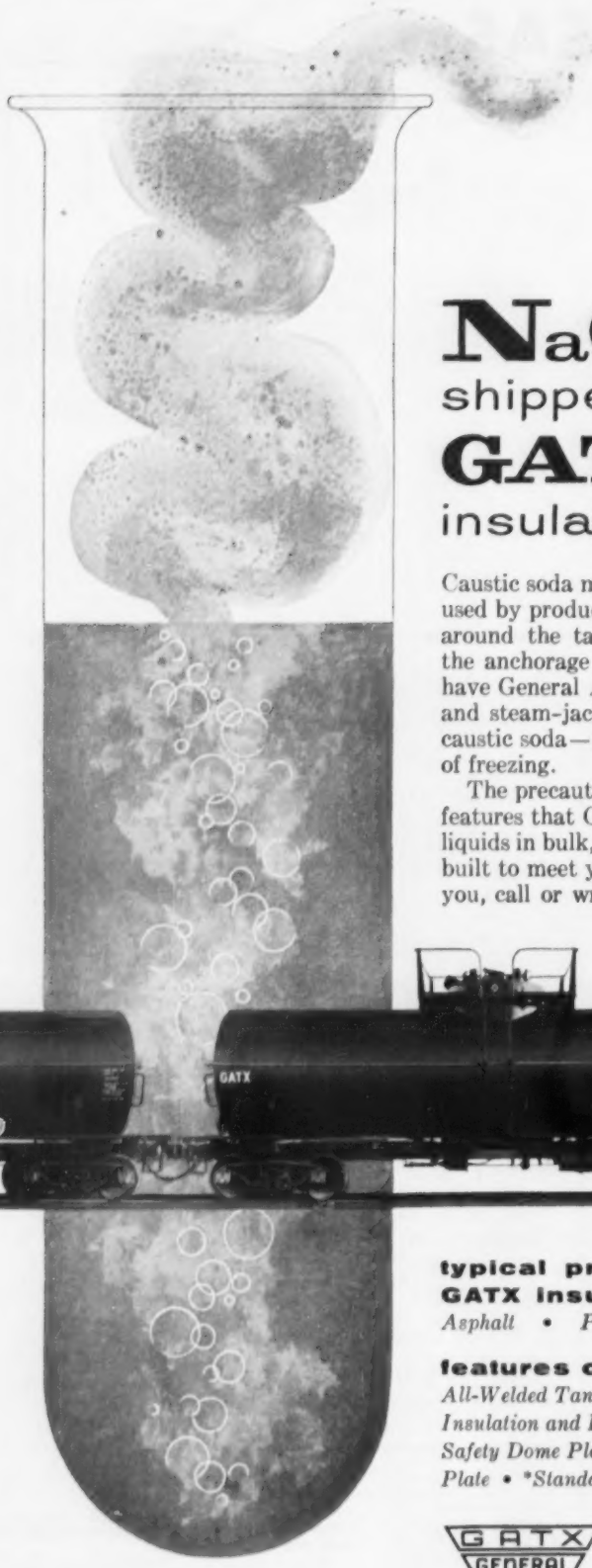
tion, we had to equip each sterilizer with a set of two, 24 in. roller conveyors, located at the exact height of the



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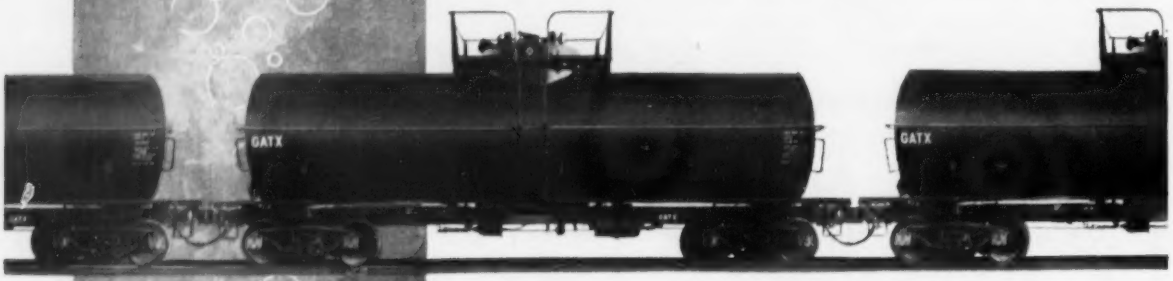
The precautions taken to protect caustic soda are typical of the features that General American builds into tank cars. If you ship liquids in bulk, there's a General American car that's built or can be built to meet your needs. To learn how GATX tank cars can help you, call or write your nearby General American district office.



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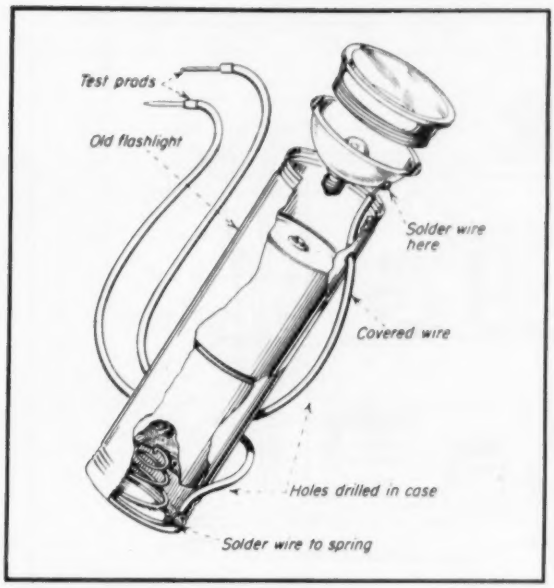
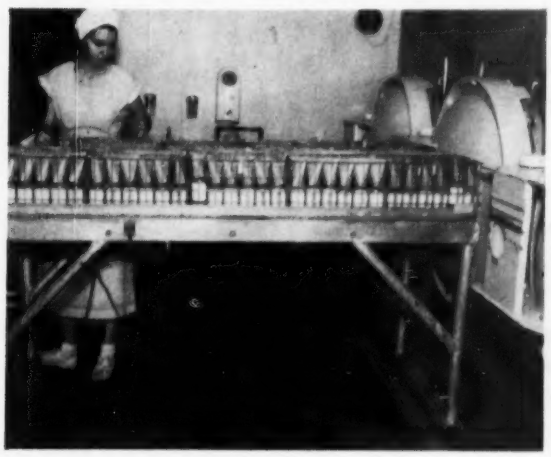


Simple Continuity Tester

Very useful about the plant is the continuity tester which can be easily made from almost any old flash light, even one discarded because the switch no longer works.

All that is necessary is to solder on a pair of test probes (see sketch) and a connection to bulb holder.—*Edgar R. Woodman, Plant Engineer, Snow Flake Canning Co., Brunswick, Me.*



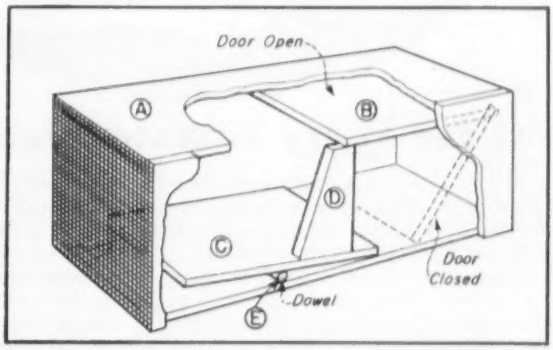
Problem In Conveyors Solved

To reduce fatigue and improve efficiency of women employees, ours is a completely conveyorized plant. The all stainless steel roller-type conveyor system is arranged at working height. From the filler operation to storage of finished product, women workers merely push baskets of filled bottles along the conveyors; never having to lift them.

Our sterilizer loading system posed a rather unique problem. We have 5 sterilizers (retorts) arranged in-line. A charge is comprised of 30 baskets of filled bottles. To conveyorize the loading and unloading of these units required the development of two mobile conveyors, which could be moved transversely between connecting conveyors and both the entrances and exits of the sterilizers. In addition, we had to equip each sterilizer with a set of two, 24 in. roller conveyors, located at the exact height of the mobile units.

The mobile units run on tracks. In the upper frame, there are two, parallel, 24 in., conveyors fixed in a rigid frame, and this frame may be moved forward, about 2 ft., on rollers fixed to the main frame. When necessary, this conveyor is locked.

In operation, the mobile unit is loaded from the feed conveyor. The door to the sterilizer (see photo) to be charged is opened and the unit positioned before it. The frame is unlocked and the entire conveyor and load is moved into the open door until this conveyor touches the fixed conveyor inside the sterilizer. Then the load is easily pushed inside. To remove the charge, at the other side of the sterilizer, a "T" shaped tool is inserted, hooked to the last line of baskets, and the load is easily pulled out onto the exit conveyor.—*Edward Wenner, Baby Formulas Co., San Francisco, Cal.*



Trap for Small Animal Pests

Not always practical are poison baits or conventional steel traps because of the danger to personnel or to children or pets that might wander onto the plant property. An easily constructed trap will avoid these dangers, and prove very efficient.

First construct a box—(A) in sketch—30 in. x 12 in. x 12 in. using 1 in. lumber. The door (B) also of 1 in. lumber is cut with one dimention longer than the vertical length of the inside of the box. This door is hinged from the inside of the top in one end of the box in such a manner that when closed it will rest at an angle to the bottom of the box and thus prevent a trapped animal from pushing it open from inside. It is important to tack a strip of tin to the inside of the door to discourage trapped animals from gnawing.

An easy way to hinge the door is to drive a nail through each side of the box at the top and into the vertical edges of the door. The back of the trap is closed by securely stapling a square of heavy hardware cloth across it.

The tripping mechanism (C) is constructed from a piece of half-inch lumber or $\frac{3}{8}$ in. plywood to which is nailed an upright door support (D). Now, fasten a length of dowel (E) to the underside of the treadle piece at the balance point.

When set, the top of the drop door rests on top of the door support. The treadle slopes toward the entrance. Bait is placed at the back of the trap beyond the end of the treadle.

Then, when any animal walks up the treadle board toward the bait, the victim's weight forces the treadle downward, pulling the door support away and allowing the door to drop.—*M. H. Naggiar, Pest Control Magazine.*

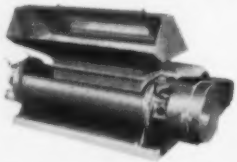
Answer: referring to the chart, a vertical line passing

Best for Every Tomato Product...

fmc SPECIALIZED TOMATO PREPARATION & PROCESSING EQUIPMENT

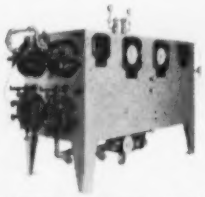
If you pack any tomato products, you are probably operating some of the FMC tomato equipment described here. For there is an FMC *Specialized* item for practically every stage in the preparation and processing of tomatoes and all tomato products. Each is engineered and built to meet the most exacting requirements, and to deliver highest quality products at lowest operating, maintenance and replacement costs. For the best in equipment for every tomato product, specify FMC—your key to Food Equipment.

FMC Pulpers and Finishers—Heavy duty frame, rigid construction. High capacities: Pulpers 5 to 20 tons per hr. Finishers 20 to 100 GPM.



FMC Tomato Chopper—Delivers small uniformly chopped product at 25 tons per hr. Table-level feed height eliminates feed elevators.

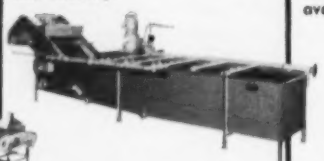
FMC Hand Pack Filler—Sturdy stainless top. Constant or variable speed drive. Sets the pace for your tomato line.



FMC Juice Processor—Continuous preheating, pasteurizing, holding and cooling in one machine. Capacities: 20-70 GPM. 1, 2 and 3-Unit Processors also available.

FMC Tomato Lines—Thorough washing, sorting and scalding on a continuous conveyor. Available in high or low pressure water systems.

FMC Flood Washer—Provides a gentle yet thorough washing action through low pressure spraying and flooding.



FMC Juice Extractors—Large screen area, extra long screw and extraction area for capacities up to 75 GPM. Lower capacity models available.

OTHER FMC TOMATO EQUIPMENT

- Rotary Washers
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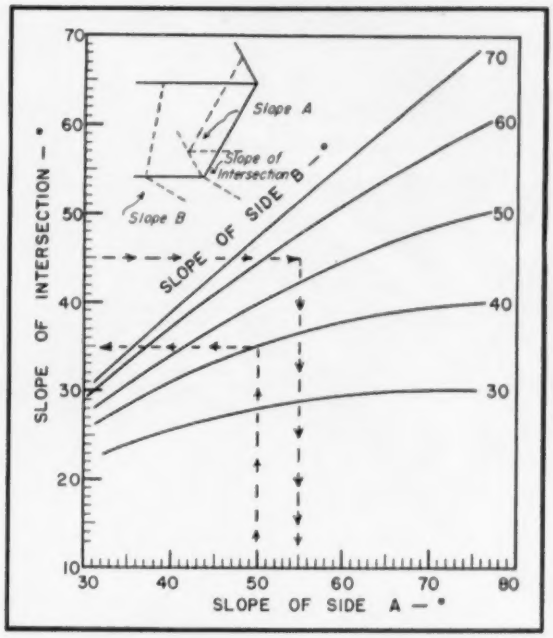


Hopper Design Chart

To get optimum gravity flow in hoppers, chutes and ducts, it is important to make sure that the slopes of all contact surfaces exceed the angle of repose of material. This handy chart will quickly give you the working figures on the true slopes for such design.

First off, factor frequently overlooked is that the true slope of the intersection of two sloping sides of a hopper, chute or duct is always less than the slope of either of the two sides. Failure to allow for this frequently results in a "hang up" of material in the dihedral formed by the sides, even though these exceed the material's angle of repose.

Slopes of two intersecting sides, A and B of a hopper are 50 and 40 deg. with respect to a horizontal plane. What is the true slope of the intersection of the sides?

Answer: referring to the chart, a vertical line passing through value 50 on the "slope of side A" (abscissa scale) intersects the curve 40 (slope of side B) at the value 35, as read on the "slope of intersection" (ordinate scale). Therefore, true slope of the intersection Sides of A and B is 35 deg.

Example 2: to provide gravity flow of a specific material from a hopper the minimum slope of any contact surface should be at least 45 deg.—that is, the angle of repose of the material is 45 deg. If the slopes of the sides are to be equal, what is the slope of each side?

Answer: the slope of the intersection is always less than either side. By proceeding along the horizontal line passing through 45 on the "slope of intersection" it is then found by inspection that at approximately 55 deg. the point of intersection of the "slope of side A" and the curve "slope of side B" the sides are of equal slope. Therefore, the sides should slope 55 deg. to insure free flow of materials.—*Joseph T. Hogan, Chemical Engineer, New Orleans.*

Detects Missing Can Labels

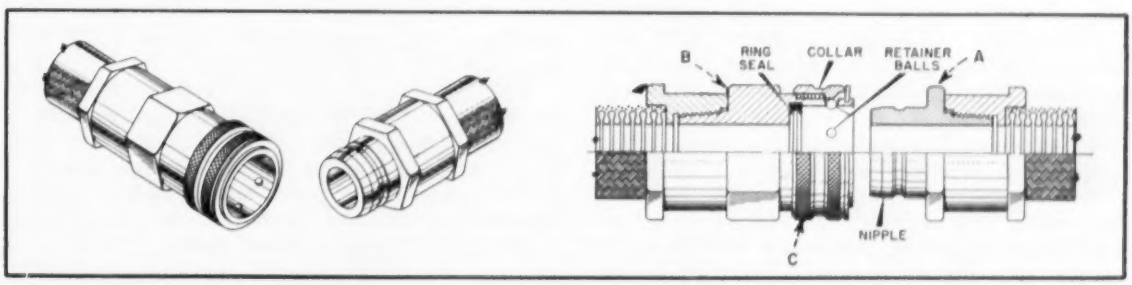
Photoelectric controls may be employed to detect the absence of labels on cans or containers having a reflecting surface beneath the labels.

One photoelectric control with two light sources and an electronic time delay relay are used. One light beam is directed onto the photoelectric control across conveyor line along which cans are passing.

The other light source is located on the same side as the photoelectric control so that its light is reflected to the phototube from a passing unlabeled can.

The photoelectric control recycles the time delay relay each time it sees a label, and the time delay interval is set so that the timer will not time out and open its load circuit as long as each can is properly labeled.

If however, an unlabeled can goes by, the photoelectric control receives light continuously. As a result the photoelectric control is not pulsed, and no impulse is given to the timer, so the timer load circuit opens and shuts down the conveyor line.—*Photoswitch, Inc., Cambridge, Mass.*



Labor Saving Hose Coupling

Here's a way to cut down the labor and increase the safety of the operation of unloading of tank cars. Largely responsible for this advance in tank car unloading procedure is a unique hose coupling manufactured by Titeflex, Inc. of Springfield, Mass.

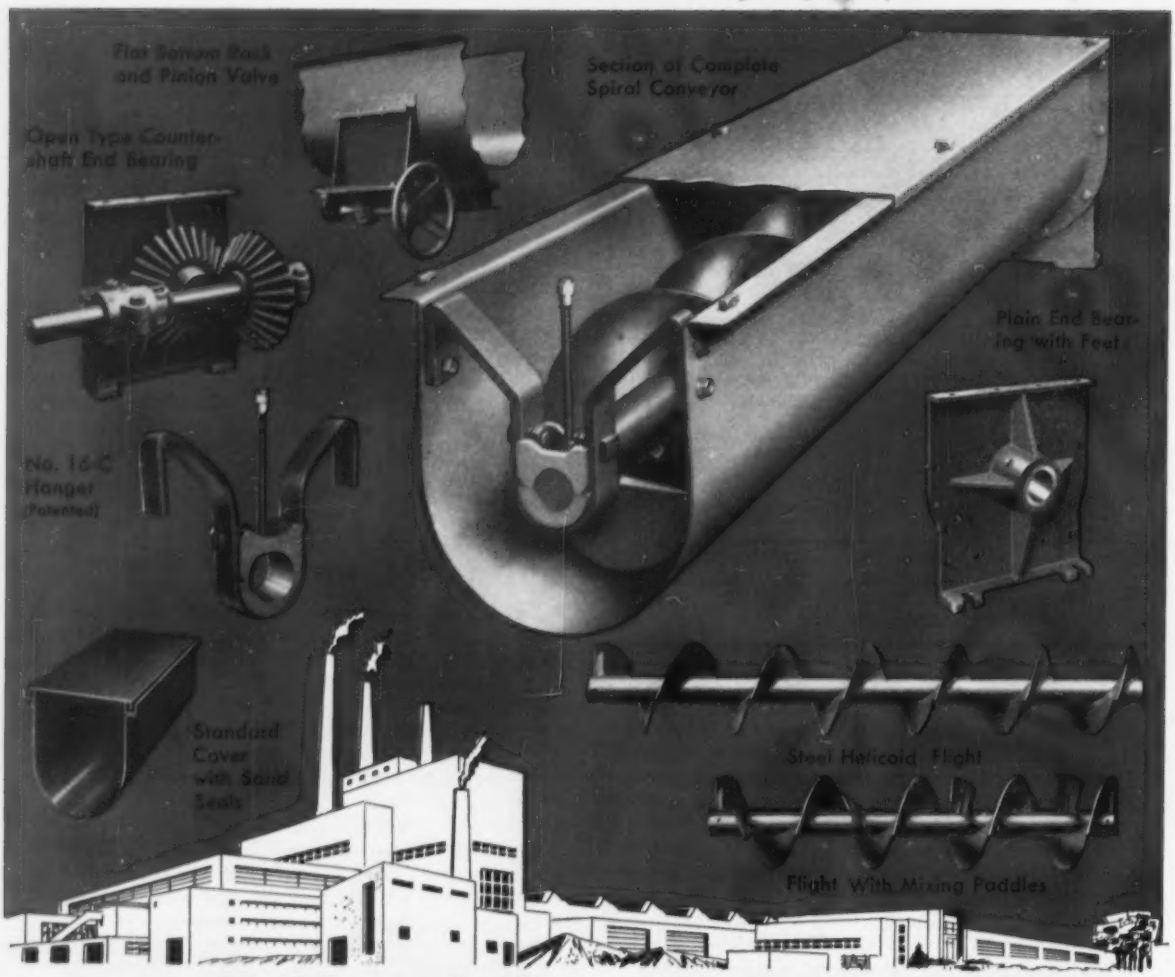
Standard practice in tank car unloading is to connect a flexible hose to the tank car by a threaded coupling. This requires using a large wrench in the restricted space below the tank car. Coupling the connecting hose to the tank car is always a laborious job that often takes two men half an hour. Also, since the sealing action in the threaded coupling is produced by two flat, metal surfaces in tight contact, the threaded coupling must be screwed on extremely tight, otherwise there will be leakage from it that will make the unloading area very slippery and present a serious safety hazard.

By replacing the threaded coupling with the Titeflex coupling the time for this hose-to-tank car connection can be reduced from half an hour to a few minutes, while safety is increased because leakage is eliminated.

Here's how coupling operates (coupling becomes clear from a glance at the cut-away sketch which shows the coupling open): When the nipple, (A) in sketch, is inserted in the coupling (B) and the collar (C) released after compressing, the nipple end of the coupling sits solidly against the seal ring. The instant the coupling is fully closed it is

sealed. Also, when fluid pressure is in the line, the seal

Unit is sturdy, efficient and inexpensive to construct.—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Section of Complete Spiral Conveyor
Open Type Countershaft End Bearing
Plain End Bearing with Feet
No. 16-C Hanger (Patented)
Standard Cover with Sand Seals
Steel Helicoid Flight
Flight With Mixing Paddles

reliable spiral conveyor performance with JEFFREY INTERCHANGEABLE PARTS

"Down time" on a spiral conveyor costs you time and money. To help you lower both these expenses, Jeffrey maintains a healthy inventory of spiral conveyor flights, end and thrust bearings, hangers, covers, discharge openings, spouts, valves and other replacement parts.

A letter or phone call to our Merchandise Sales Division in Columbus or your nearest Jeffrey District Office or Jeffrey Distributor will get quick action. Immediate shipment of reliable Jeffrey interchangeable parts will put your spiral conveyor unit back in operation on the double. Better yet, don't wait for breakdowns, order a supply of essential Jeffrey replacements now.

Jeffrey builds all spiral conveyor components on equipment designed especially for that purpose. Uniform strength and true alignment result — every time. All flights and fittings conform to new industrial standards making them interchangeable with other standard makes.

For reliable performance, specify Jeffrey — whether the smallest renewal part or a new standard spiral conveyor engineered for your special needs.

Write for Spiral Conveyor Catalog 851.

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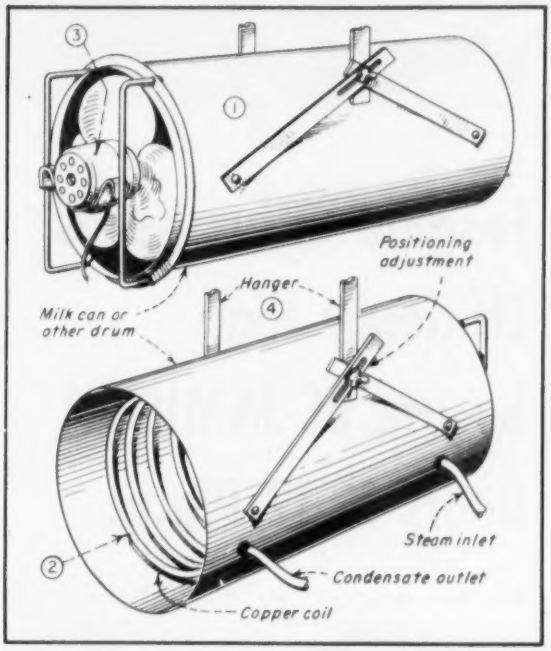
PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED

. . .IT'S A JOB FOR JEFFREY!

sealed. Also, when fluid pressure is in the line, the seal ring's lips are expanded and pushed against the facing ends of the coupling. This makes the seal tighter as pressure inside the line increases.

Collar arrangement in this coupling permits a full swiveling action, so that neither end of the coupling has to be twisted to connect or disconnect. This enables one man to engage or disengage the coupling. Furthermore, the absence of twisting prevents kinking of the hose—the action which generally starts hose failure.—*FE Staff.*



Home-Made Forced Air Heater

Here's a way to fabricate a heater in a hurry and at very small cost:

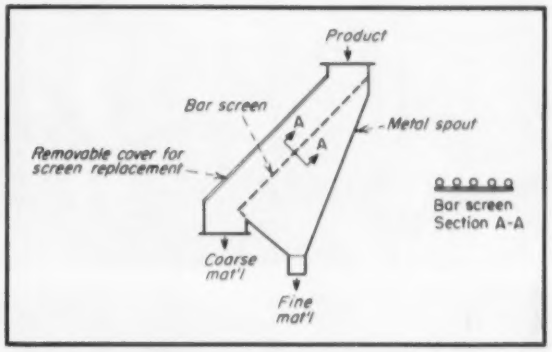
First procure an old discarded 10 gal. milk can and cut out the bottom and top, leaving just a galvanized cylinder—(1) in sketch.

Next, form a coil from 50 ft. of ½ in copper pipe (2). Then cut a hole in each end of the cylinder for steamline entrance to the coil and exit for condensate.

Now, a small motor driven fan (3) is fastened to a bracket at what is to be the rear of the heater, and so placed that blades are just inside coil. Then air may be forced through the heater without any back movement.

Finally the straps or hangers (4) for suspending the heater are made adjustable so that the warmed air may be deflected up or down over a wide angle.

Unit is sturdy, efficient and inexpensive to construct.—*D. H. Manwaring, Idaho Manager, Nelson Ricks Creamery, Rexburg, Idaho*



Easy to Make Separator

When one of the products to be separated is very coarse and the other very fine, metal bars, placed parallel in a spout (see sketch) and angled at approximately 45 deg., will make the separation.

Size of the bars, the spacing, the size of the screen (area) and the slope of the bars are all dependent upon the characteristics of the materials to be separated. Spacing of bars is readily determined by trial-and-error, starting with the spacing wider than the fine material and closer than the coarse—*Paul Berg, Professional Engineer, Fort Wayne, Ind.*

Filler and Closer Synchronized

When we purchased our new FMC hand-pack filler it came with a flat belt pulley drive. It was our plan, however, to drive the filler by sprocket and chain directly from the power take-off on and in synchronization with our standard 400-Canco closing machine. Power take-off shaft of latter made one revolution per can closed while the filler shaft made two revolutions per can filled.

We bought the necessary sprockets with 2:1 ratio and installed them. The filler sprocket was assembled by welding it to the hub of the flat belt pulley. Then, the lever action of the clutch was reversed and a new lever arm assembled in handy reach of the closing machine operator.

We then bevelled the filler discharge plate and set up the two units so that the bevelled filler discharge plate and the closing machine intake plate were overlapped so that when they rotated in operation there was a smooth transfer of filled cans from the filler to the closing machine.

Since the closing machine is equipped with a variable

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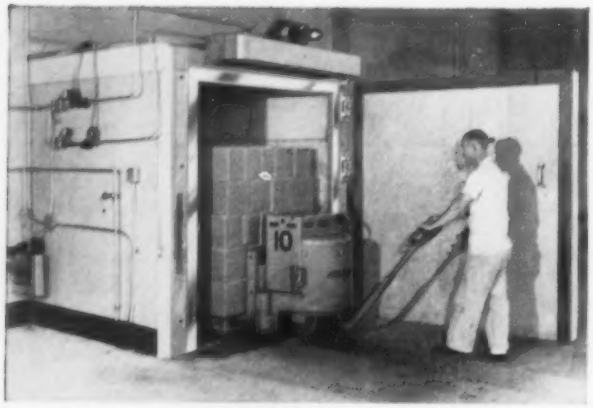
Just send us the facts about your idea and its application. And include a free-hand sketch or snapshot to illustrate it.

We'll do the finished writing and drawing for you.

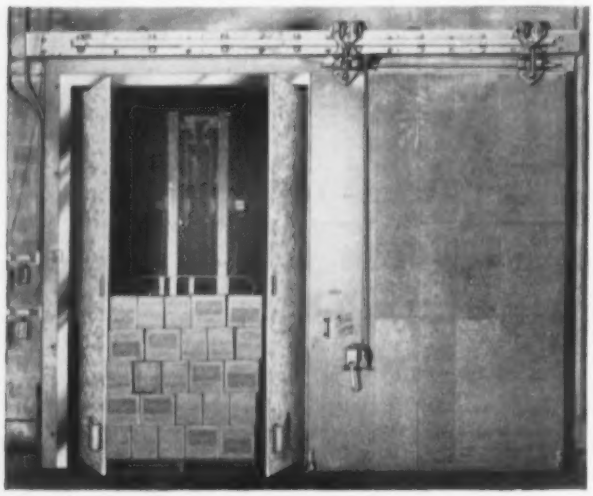
Send it today, before you forget. Address it to Practical Ideas Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.—The Editors

MARCH PRACTICAL IDEA WINNER was "Takes Lugging Out of 'Beef Lugging,'" submitted by M. J. Hess, Assistant Chief Engineer, Wilson & Co., Inc., Hinsdale, Ill.



There's a JAMISON Cold Storage Door for every use and every purpose. As suggested by these illustrations, Jamison doors do the job at the Fosgate Citrus Concentrate Cooperative, Orlando, Florida.

When floor space is at a premium, and high building costs dictate space savings, investigate the possibilities of a JAMISON Horizontal Sliding Door such as this.



Fosgate Citrus Keeps Efficiency High by use of JAMISON Doors in 12 Places

Vestibule doors, sliding doors, big doors for fork-truck traffic, and small doors for personnel movement all have a place in a modern citrus concentrate plant or any other place where food must be stored and handled. And when conditions are critical or super-efficiency is required a "best-choice" is a JAMISON Cold Storage Door.

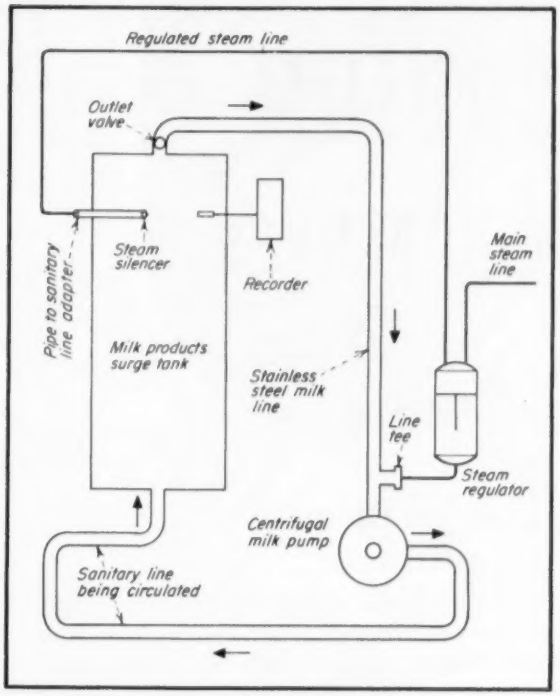
Jamison engineers and builds a door to suit your exact needs and requirements. Consult your architect or write, JAMISON COLD STORAGE DOOR CO., HAGERSTOWN, MARYLAND, U. S. A.

JAMISON
HAGERSTOWN, MARYLAND, U. S. A.

More JAMISON Doors are used by *more* people than any other Cold Storage Door in the world.

speed drive, it is now possible to change the speed of the machines while maintaining complete synchronization at all times.

Making these arrangements meant that we were able to save the purchase price of a separate variable speed drive on the filler and avoid all the adjusting necessary to keep two machines in synchronization while running at variable speeds.—L. W. Spain, Plant Engineer, Bozeman Canning Co., Bozeman, Montana.



CIP Temperature Control

Control of temperature of cleaning solution and the time the solution is circulated is necessary in CIP cleaning if the operation is to be efficient.

Here's the hook-up we made to be sure of efficient cleaning:

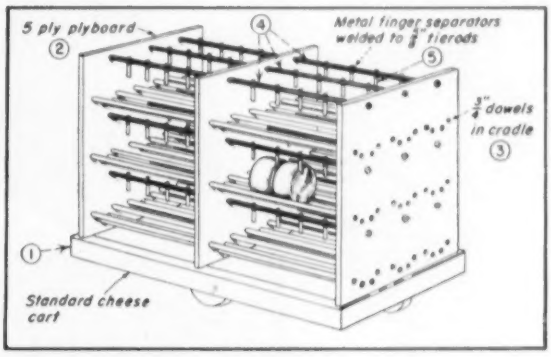
We converted one of our surge tanks (see sketch), which is located close to a pump of proper capacity for desired solution velocity, into a cleaning solution tank during the time when CIP cleaning is in operation.

Sanitary line that runs from the tank outlet valve to the pump is fitted with a tee. For CIP the cap is removed from the tee first and then the bulb of a steam regulator is inserted.

The steam line from the regulator mounted on a nearby wall runs to just above a tank inlet at which point a pipe to the sanitary fitting is installed. Then when the tank is used for CIP, a piece of sanitary line is attached and extended down into the cleaning solution.

This hook-up maintains whatever solution temperature may be desired.

In order to have a permanent record of the time and temperature, we also installed a recording thermometer on the wall with its bulb dropped into the solution tank during CIP. We have found that this method of control works equally as well as a special unit with tank, pump, steam regulator, etc. and is considerably less expensive.—*C. E. Fisher, production manager, Borden's, Columbus, Ohio.*

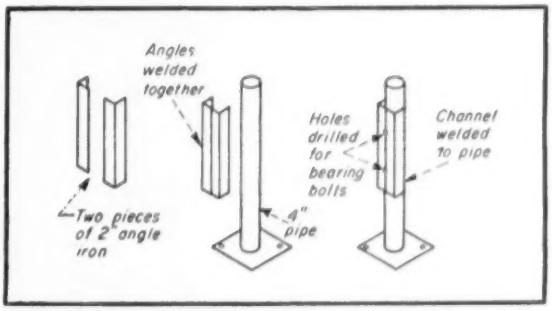


Cart Speeds Cheese Drying

We have found a solution to a problem generally experienced in our industry, cheese manufacturing. Difficulty was encountered by not getting cheese sufficiently dry for the wax coating to adhere.

This problem is overcome in our plant through use of special drying structure built on carts which permit free circulation of air around the daisy or triplet. Thus prevented is the all too prevalent "wet spot" which usually results when the cheese is laid on a flat surface to dry.

The superstructure is constructed on a standard cheese cart—(1) in sketch—with ends and center sections formed of 5-ply sheets (2). Through these plys, and shaped in the form of a cradle, holes are drilled for the insertion from one end of the rack to the other of ¾ in. dowels (3). To increase supporting strength, employed are ⅜ in. metal tie-roads (4) on which to weld metal fingers (5) as a means of separating cheese forms.—*Ivan R. Miller, Superintendent, Upper Snake River Valley Dairymen's Association, Inc., Rexburg, Idaho.*



Flat Surface Added to Circular Columns

Heavy-duty pipes of 4 in. size serve very satisfactorily as columns, also for other structural purposes. But they don't provide flat surfaces to which auxiliary equipment may be attached.

We recently had to devise a solution to this problem when it became necessary to mount a flat bearing on a 4-in. upright.

This is the way we made the flat surface to which the bearing was readily attached: Two lengths of heavy 2 in. angle iron were welded together to make a 4 in. channel. The sides of this channel, in turn, were welded to the 4 in. pipe, so that the back of the piece provided a flat surface to which the bearing could be mounted.

Holes then were drilled through both angle iron and pipe for insertion of bolts to anchor the bearing.—*William Morgan, Jr., Superintendent, Sugar Loaf Foods, Inc., Brookston, Ind.*

introducing

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LOW SODIUM CHEMICAL ADDITIVES

Mallinckrodt provides a new service for food manufacturers

Knowing and anticipating chemical requirements is paramount with all Mallinckrodt research, development and sales people . . . and is reflected in the quality and design of Mallinckrodt chemicals. Mallinckrodt's new line of low sodium chemicals is an example of their accomplishments.

LOW SODIUM — IMPORTANT IN DIETETIC FOODS

Sodium-restricted diets are an increasingly important factor in the control of many diseases and conditions which are complicated by fluid retention. Reduced sodium intake aids in the elimination of fluid, often increasing the efficiency of the kidneys and heart. This makes control of the disease or condition easier.

Low sodium diets, under the supervision of a physician, frequently require special dietetic foods as well as abstinence from table salt. Mallinckrodt low sodium chemicals are a refinement which opens the door to better and easier control of sodium content in low sodium dietetic foods.

These are some of the ways in which dietetic food manufacturers may find it advantageous to use Mallinckrodt low sodium chemicals: *ammonium chloride low sodium* and *calcium carbonate low sodium* in dietetic breads, *calcium chloride low sodium* in cheeses and canned tomatoes, *calcium gluconate low sodium* in canned potatoes and tomatoes, *potassium carbonate low sodium* in cocoa and chocolate, and *potassium chloride low sodium* as an ingredient in salt substitutes.

for use in Special

DIETETIC FOODS

THE CHEMICALS NOW AVAILABLE

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Ammonium Salicylate NF Low Sodium
Calcium Carbonate Precipitated USP Light Low Sodium
Calcium Chloride Anhydrous Low Sodium
Calcium Chloride USP Granular Low Sodium
Calcium Gluconate USP Powder Low Sodium
Potassium Carbonate Anhydrous Low Sodium
Potassium Chloride USP Granular Low Sodium
Potassium Chloride USP Powder Low Sodium

You are invited to contact us for any low sodium chemicals in which you are interested. Mallinckrodt is prepared to supply many chemicals to close sodium limits, in recognition of the rapidly growing importance of sodium content in dietetic foods as well as in dietetic pharmaceutical preparations.

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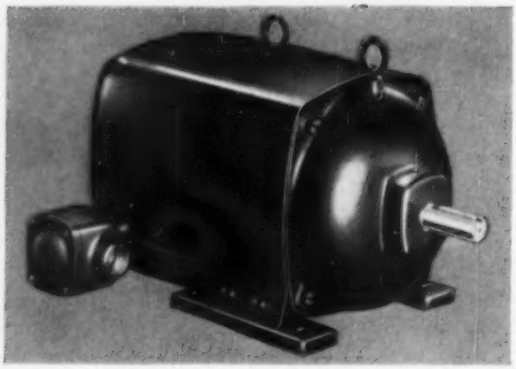

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LELAND never cuts corners

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There are many different ways to build an electric motor — drip-proof, totally enclosed, explosion-proof. . . .

Basically, however, there are only two. To meet necessary specifications. Or to build it as though you yourself were the end user . . . to build it as you know it *ought* to be built.

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Every Leland is made of the finest materials available consistent with user economy. Every Leland is designed to be better than it *has* to be.

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gb SNAP*ON

Less than two years ago it was a time-consuming and expensive job to insulate plant piping. Not so today, thanks to a new concept in pipe insulation — G-B Snap*On, the new one-piece molded pipe insulation of fine glass fibers.

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All this adds up to quicker, easier application than you've ever experienced. So don't fail to try Snap*On the very next time you need insulation from chilled or heated piping where temperatures do not exceed 350°. You'll find there's absolutely *nothing* like it for *economical application, thermal efficiency* and *permanence.*

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Here are the advantages:

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LP-Gas burns clean, with nearly perfect combustion, leaves no carbon or lead deposits—does not dilute cylinder lubricant. Engines have run up to 8,000 hours before major overhaul was necessary.

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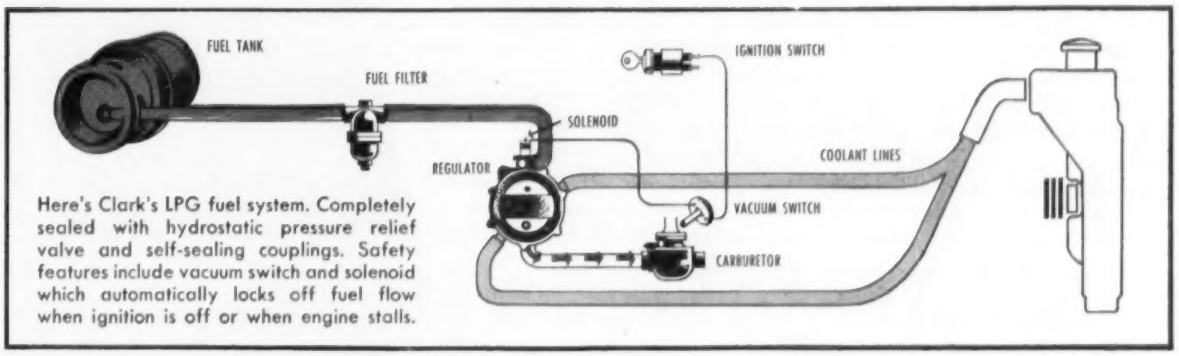
You get quieter, smoother operation, higher octane fuel, faster refueling (only 3 minutes to change tanks), much less downtime.

What about safety? Clark factory installed LPG carburetion systems are fully approved for safety by Underwriters' Laboratories.

What's the best system? Clark's factory installed LPG system is specially engineered from fuel tank to exhaust pipe. Engine is designed for maximum LPG benefits, has higher compression ratio, cold manifold, stellite valves and seats, positive valve rotators. Fuel system is sealed and designed for complete fuel combustion . . . top economy.

What's available? Clark offers a complete line of U-L approved LP-Gas trucks in capacities from 2000 to 7000 lbs.



Here's Clark's LPG fuel system. Completely sealed with hydrostatic pressure relief valve and self-sealing couplings. Safety features include vacuum switch and solenoid which automatically locks off fuel flow when ignition is off or when engine stalls.

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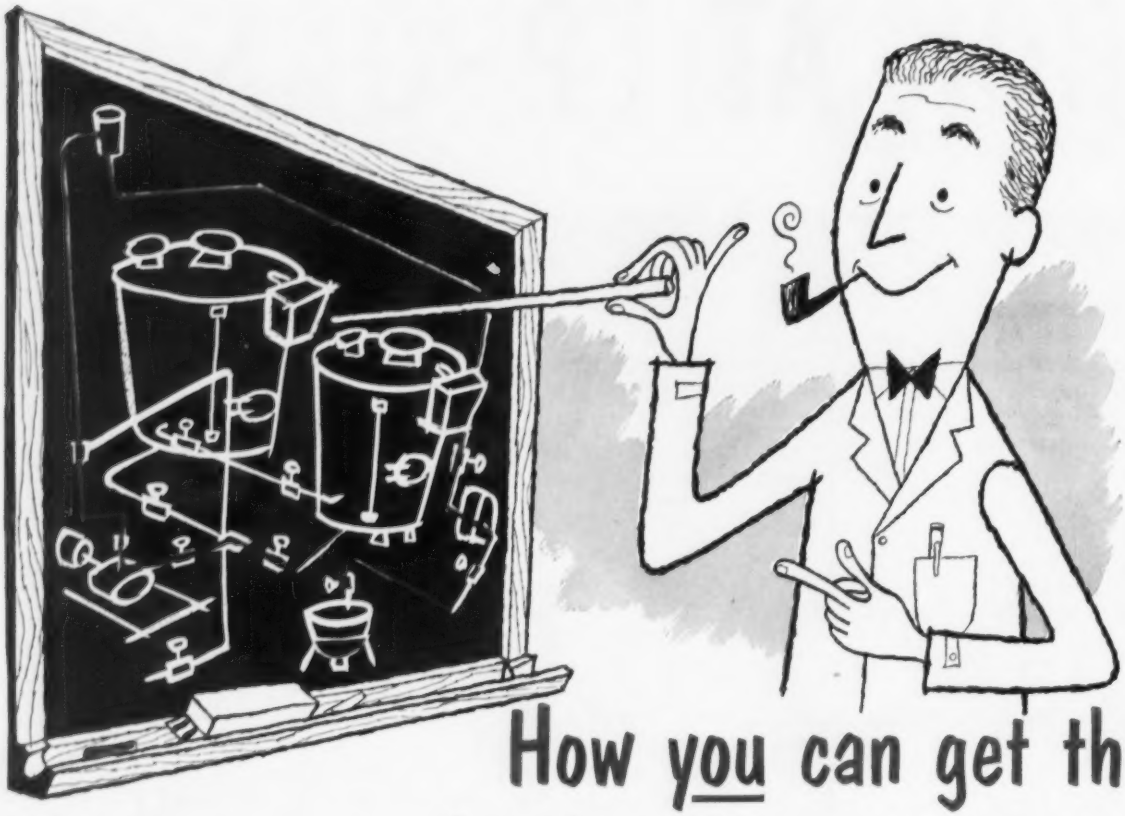


How you can get the most out of a liquid sugar system

"These three hints," maintains your Flo-Sweet Engineer, "will help you get the most out of your liquid sugar system.

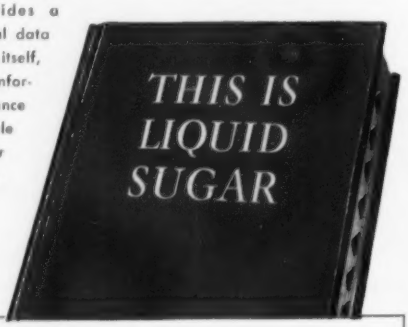
"First, make sure the system is designed by engineers who are experienced both in liquid sugar and in the technology of your food products.

"Second, have these engineers install the system.

"And third, use only top quality liquid sugar, blended accurately to your individual specifications.

"Here at Flo-Sweet we're in the habit of helping food manufacturers with all three of these important steps. In fact, that's our one and only business. If you aren't already enjoying the convenience . . . the sanitation . . . the cost-cutting and quality-improving advantages of a Flo-Sweet system — why not check with us today?"

"MUST" READING FOR EVERY SUGAR USER: This authoritative new manual contains over 200 pages of detailed information on the design, installation and operation of liquid sugar systems. It covers the use of liquid sugar in major food industries, provides a wealth of technical data on liquid sugar itself, and gives specific information on performance and costs. A valuable reference work for every food technologist's library. Price $5.00.



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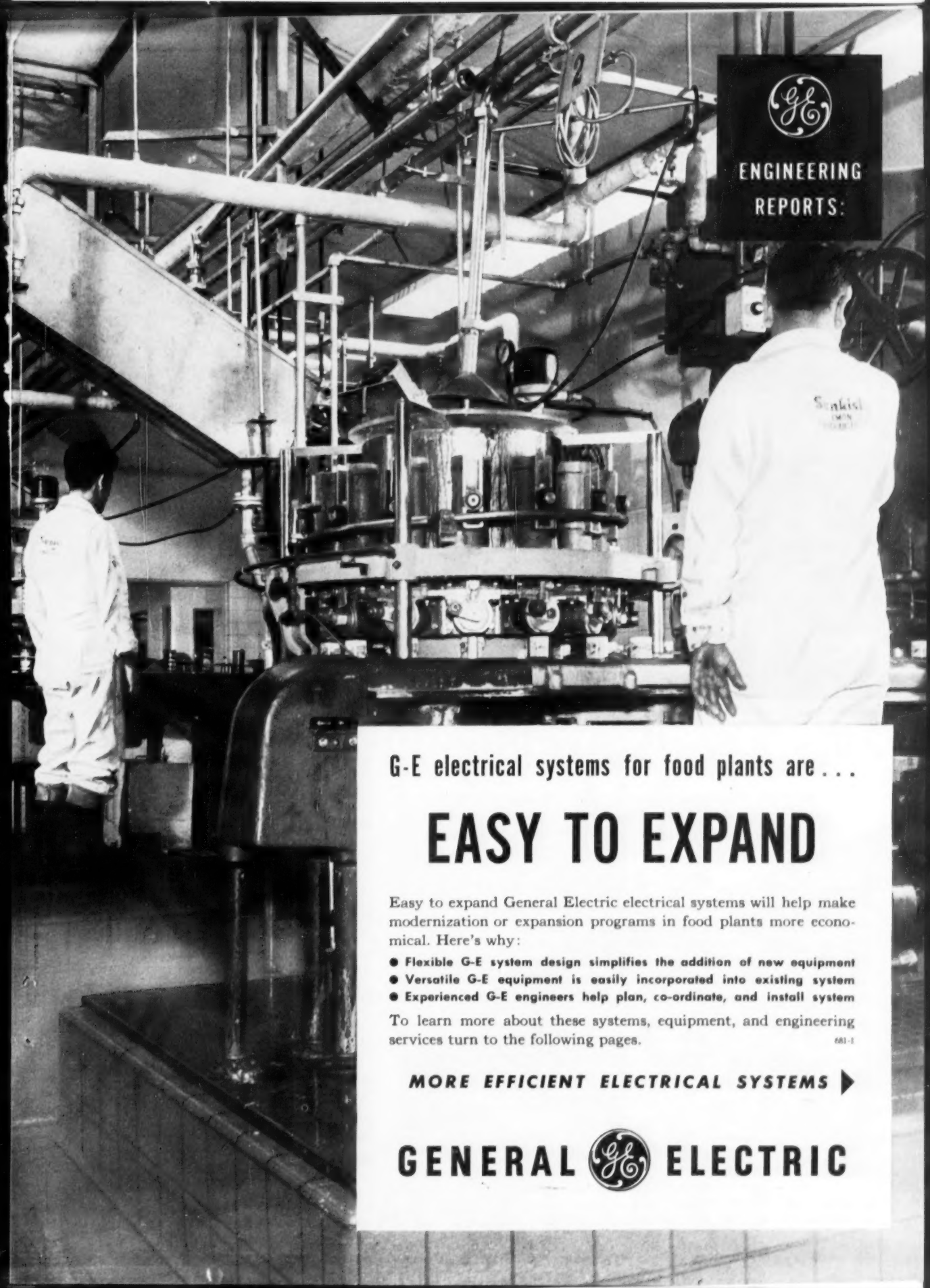

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G-E electrical systems for food plants are . . .

EASY TO EXPAND

Easy to expand General Electric electrical systems will help make modernization or expansion programs in food plants more economical. Here's why:

- **Flexible G-E system design simplifies the addition of new equipment**
- **Versatile G-E equipment is easily incorporated into existing system**
- **Experienced G-E engineers help plan, co-ordinate, and install system**

To learn more about these systems, equipment, and engineering services turn to the following pages. 681-1

MORE EFFICIENT ELECTRICAL SYSTEMS ▶

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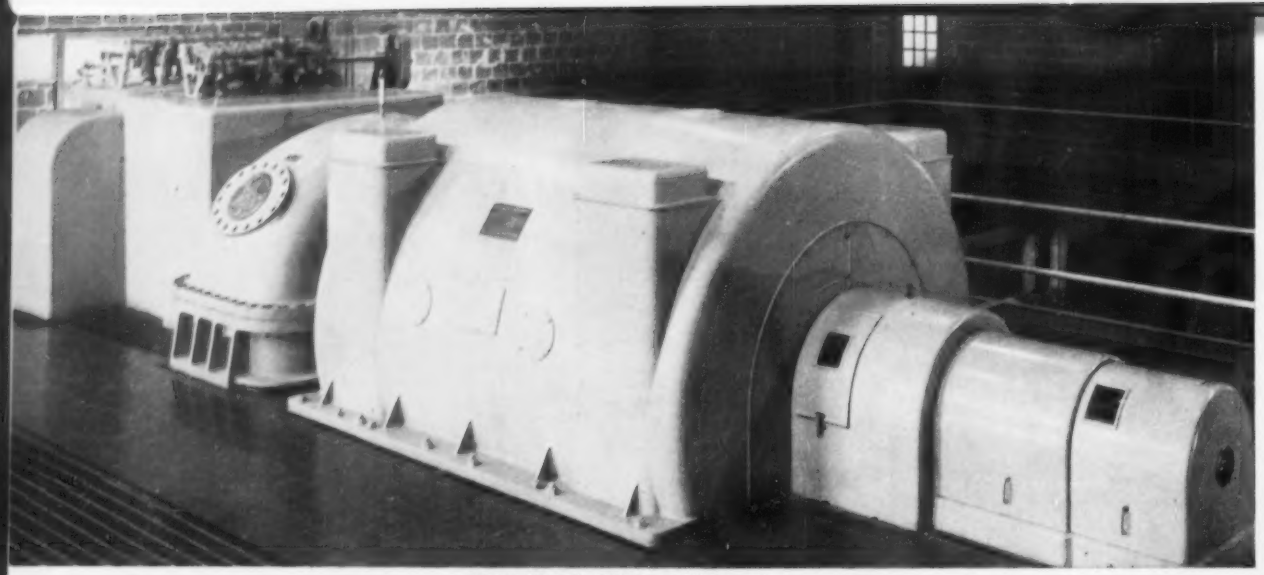
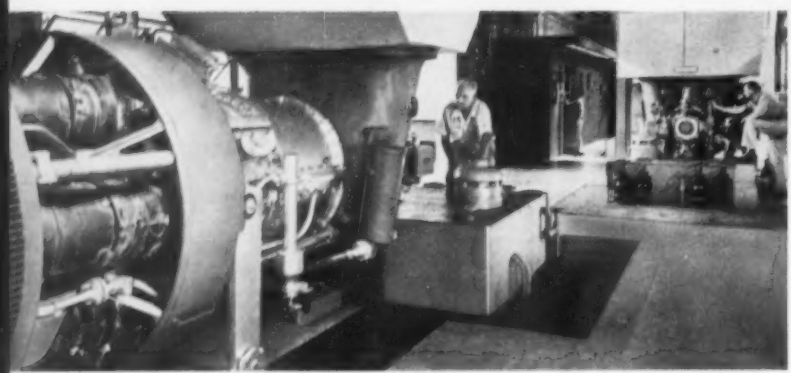
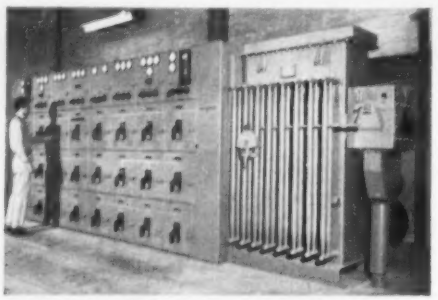


UTILIZING PROCESS STEAM, G.E.'s complete range of steam turbine-generators provide electric power as a by-product, help maintain plant steam balance.



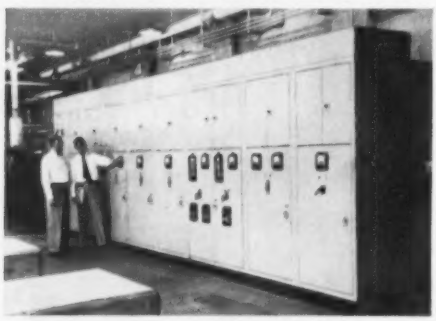
DEPENDABLE G-E gas turbines range from 6700 to 1700 hp. More than 55 units utilize exhaust heat for power generation and mechanical drive applications.



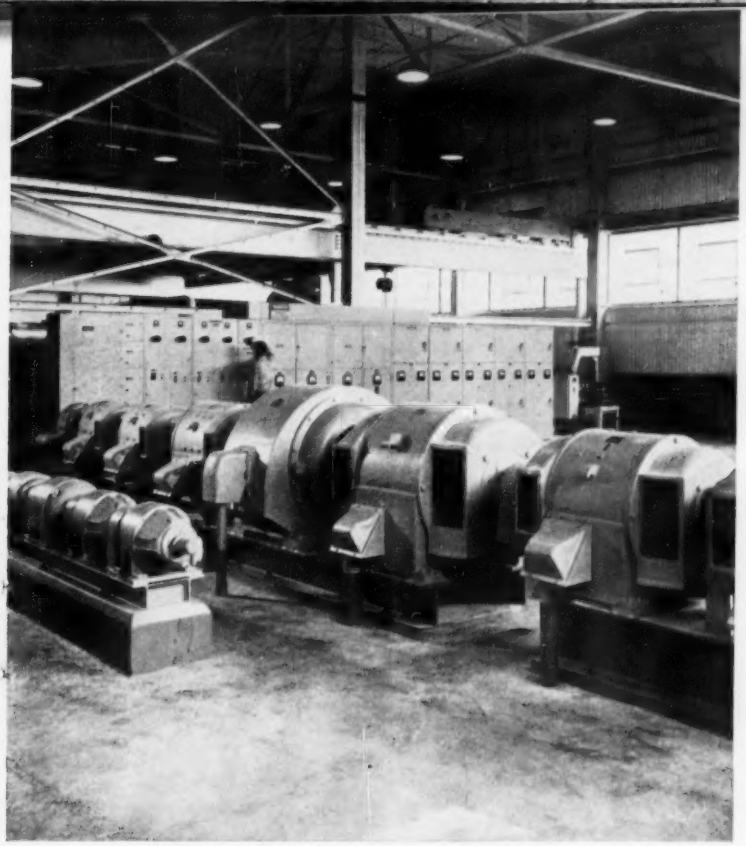
FACTORY ASSEMBLED G-E load center unit substations help cut installation time.

COMPLETE, COMPACT, G-E motor control centers provide centralized control in load areas.

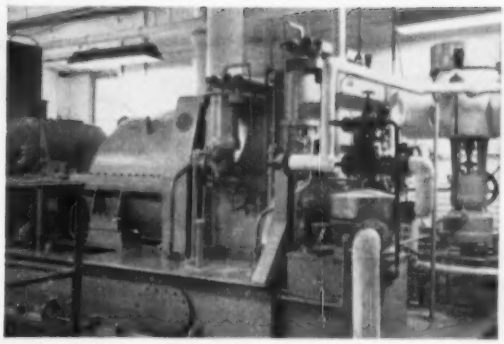
MORE RELIABLE POWER DISTRIBUTION is available with G-E package substations which use co-ordinator transformers, metal-clad switchgear.



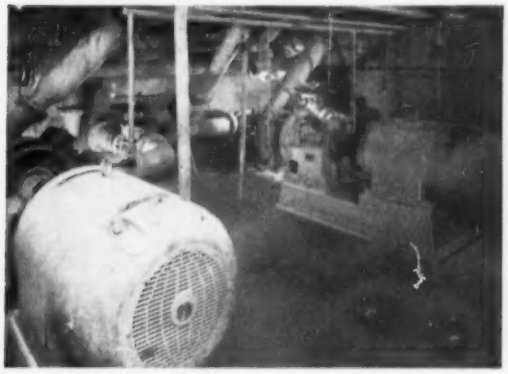
SAVE FLOOR SPACE with compact G-E Limitamp control units.



DEPENDABLE G-E d-c motor generator sets are designed to operate in continuous service at top efficiency. Minimum of maintenance is a key feature of these sturdy generators built for long life.



ECONOMICAL MAINTENANCE is a key feature in design of G-E mechanical drive turbines.



RUGGED CONSTRUCTION of G-E Tri-Clad* motors make them ideal for all types of drive operations. Polyex insulation in motors 100-3000 hp gives 50% longer motor life. *Reg. Trademark of General Electric Co.

G-E engineering services, equipment can give you . . .

More efficient electrical systems

MODERNIZING, EXPANDING, BUILDING? Whatever your plans, let experienced G-E engineers help plan a more efficient electrical system for you. They will work with you or your engineering contractors to give you correct answers to the following questions.

SHOULD YOU GENERATE OR PURCHASE POWER? G-E engineers will help make a "load" survey of your facilities, and recommend an economical solution to your particular power supply problem.

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WHAT KIND OF DRIVE EQUIPMENT SHOULD YOU USE? Each application for drives in your processing lines will be individually examined by G-E engineers to assure that the proper drive is designated for the job.

WHERE CAN YOU UTILIZE AUTOMATIC CONTROLS? New developments in the field of automatic controls will be applied throughout your processing lines by G-E engineers.

Let your General Electric Apparatus Sales Representative get you detailed answers to these and other electrical questions. Contact him at your nearest G-E Apparatus Sales Office early in your planning stages. General Electric Company, Schenectady 5, N. Y. 681-3

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Engineered Electrical Systems for Process Industries

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SIX G-E ENGINEERING SERVICES . . .

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1 **G-E APPLICATION ENGINEERING** helps you and your consultants design the right electric system for your plant.

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3 **G-E PRODUCT DEVELOPMENT** laboratories design and test new equipment under tomorrow's conditions to meet your future demands.

4 **G-E FIELD-SERVICE ENGINEERING** helps you supervise installation, expedite start-up of your major electric equipment.

5 **G-E MAINTENANCE SERVICE** from 31 G-E Service Shops will repair and uprate your old equipment, help establish productive maintenance of your equipment, furnish emergency service.

6 **G-E PROJECT CO-ORDINATION** means on-time engineering, shipment, installation of your electric equipment from preliminary diagrams through start-up.

These valuable services are available to you with General Electric equipment. Contact any General Electric Apparatus Sales Office. Meanwhile, for the full story of G-E engineering services, write for brochure GED-2244, General Electric Co., Sect. 681-3, Schenectady 5, N. Y.

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This breastplate is a product of skillful 16th Century armor-making. The expert fitting and forming of this sturdy garment permit all the necessary mobility, while the superb carving and embossment reveal it as a true work of art. And most important of all, the studied design and careful workmanship assure maximum protection to the wearer.

J&L Steel Containers offer dependable protection for your products. They're built of sturdy, high-quality J&L Steel Sheet. Their careful construction insures perfect fit of all joints and movable parts. And they have a trim appearance which can be attractively decorated with colorful designs and illustrations by J&L's accurate lithographic process.

In addition, coatings and lacquers are evenly applied—both inside and outside; and J&L pails and drums are chemically treated to keep all surfaces clean and dry.

For the protection your products need, depend on J&L Steel Containers. You can order them through plants in leading industrial centers, and you'll find J&L service prompt and efficient.

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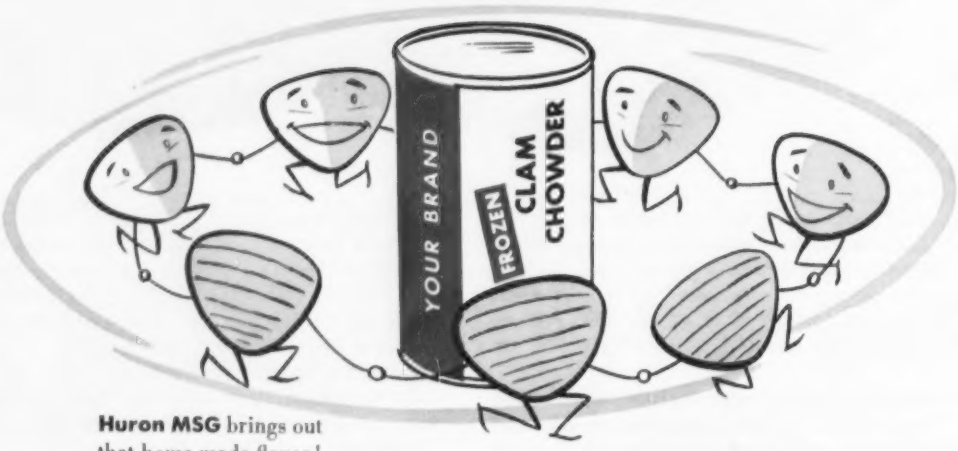
tastes better

Frozen soup sells faster, when you add



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*PROOF OF CONSUMER PREFERENCE for MSG-treated frozen foods, along with recommended use-levels, is yours in new University of Massachusetts Department of Food Technology test reports. Write for your free copy to The Huron Milling Co., 9 Park Place, New York 7, N. Y. Join the ranks of leading processors already using Huron MSG in their frozen clam chowders, bisque, other frozen soups, and creamed seafood preparations. B.4.28

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PURE MONOSODIUM GLUTAMATE 99+%

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NEW DU PONT ODORLESS

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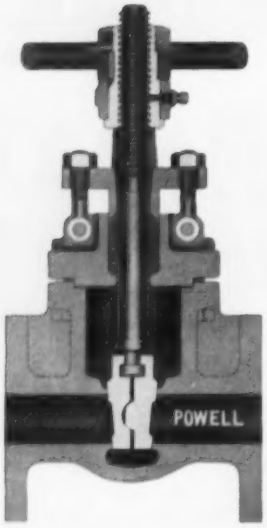
Preferred for Precision and Performance



Powell Valves are the choice of engineers because they know every valve is precision made, meeting every specification—every time.

And there are other good reasons why engineers prefer Powell Valves—because Powell Valves are dependable . . . economical . . . and Powell has the COMPLETE quality line of valves.

Consult your Powell Valve distributor. If none is near you, we'll be pleased to tell you about our complete line, and help solve any flow control problem you may have.

The Wm. Powell Company
Cincinnati 22, Ohio . . . 109th year

FIG. 2495 (Sectional)—Stainless Steel O. S. & Y. Gate Valve for 150 Pounds W. P. Double Wedge Disc is accurately guided to seat.

FIG. 2193—Large Ni-Resist* Gate Valve for 200 Pounds W. O. G.

FIG. 375—Bronze Gate Valve for 200 Pounds W. S. P.

FIG. 150—Bronze Vulcanized Composition Disc Globe Valve for 150 Pounds W. S. P.

*Trade-mark of The International Nickel Co.

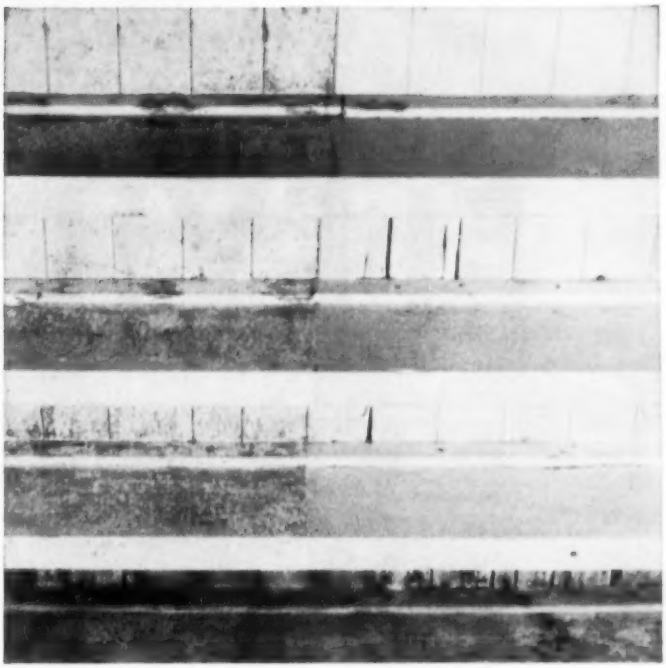
POWELL VALVES

For more information, use coupon on last page.

NEW DU PONT ODORLESS MILDEW-RESISTANT ENAMEL

solves mildew problem in hundreds of food plants

Food-plant managers across the country have found that Du Pont Odorless Mildew-Resistant Enamel Oyster White retards the growth of most types of mildew on walls and ceilings. Formulated with solubilized copper-8-quinolinolate fungicide, Du Pont Mildew-Resistant Enamel is especially suitable for meat-packing plants, poultry and cheese plants, creameries and other areas where mildew presents a major problem. Tests prove that in most types of food processing plants it effectively retards mildew formation for months . . . eliminates the need for constant cleaning and scrubbing. And Du Pont Mildew-Resistant Enamel resists chipping and cracking . . . stays bright-looking month after month. What's more, when you consider the expense of constant cleaning, you'll realize just how economical this superior maintenance finish is. Mail the coupon today for complete information.



Photograph shows section of beamed ceiling in food-processing plant after three years' exposure. Lower strip: cleaned but left unpainted. Upper left: painted with ordinary non-fungicide enamel. Upper right: painted with Du Pont Mildew-Resistant Enamel.

Check these important advantages:

- ✓ **Effectively retards most types of mildew**
- ✓ **Cuts maintenance costs**
- ✓ **Odorless during application**

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Gentlemen:
Please send me, without obligation, free literature on how to combat mildew.

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PAINTS

Chemically engineered to do the job better

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FLEXIDYNE

THE DRY FLUID DRIVE

DODGE of Mishawaka Announces An Entirely New Development in Industrial Power Drives that Promises to Revolutionize Drive Performance! Every Design Engineer and Plant Operating Man in America Will Want the Following Information.

Here are the facts on how easily Flexidyne handles difficult starting problems, and gives a *new* kind of protection against shock and overloads.

While new in the United States, this drive has already been proved in thousands of installations in Europe. Dodge has redesigned it to American standards and now makes its dramatic advantages available to all industry.

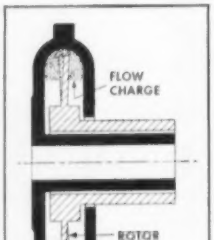
Flexidyne is a *dry fluid drive*. Its advantages over any other fluid-type drive are based on the fact that at normal operating conditions it *does not slip*.

WHAT IT IS

The Flexidyne Drive is made up of a housing, inside of which a rotor is free to turn concentrically. Between the two are fine particles of spherical steel shot, called the "flow charge," which acts very much like a fluid. The flow charge transmits power from housing to rotor.

This flow charge is easy to seal in, has a high density and can stand relatively high temperatures. The use of this flow charge makes possible a design that is simple, compact, economical, and gives outstanding new and different operating characteristics.

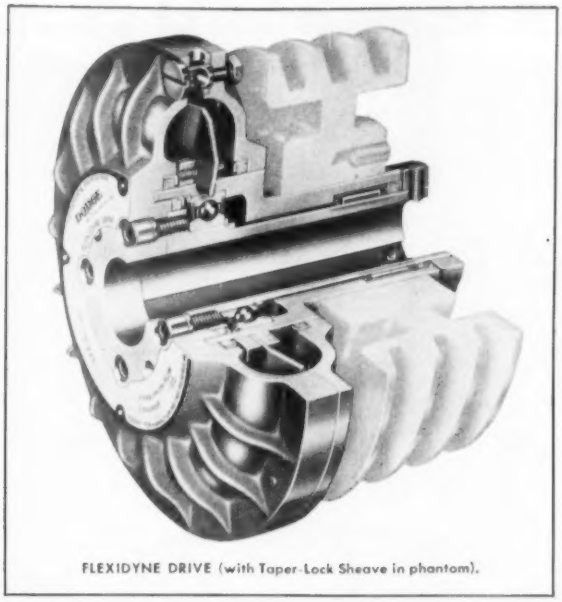
HOW IT WORKS



1. The motor is connected to the housing, and starts it turning at no load.

2. The flow charge is thrown to the circumference of the housing, is compressed by centrifugal force, and revolves with the housing.

3. The rotor, connected to the load, is started and accelerated by the friction and wedging action of the revolving flow charge.



FLEXIDYNE DRIVE (with Taper-Lock Sheave in phantom).

4. Rotor and housing reach identical speeds—the Flexidyne operates with ZERO SLIPPAGE between motor and load at normal running speeds.

5. Before overloads cause damage, the Flexidyne rotor slips relative to the housing, overcoming the friction and wedging action of the flow charge. A thermal switch (optional) automatically cuts the electrical circuit if an overload persists.

6. The amount of the flow charge determines the torque capacity.

WHAT IT DOES

The Flexidyne gives you the *exact* starting torque you need, for anything from the smoothest to the fastest start. Once the load reaches normal speed, there is zero slip, giving 100% efficiency. Also, it provides *accurate* overload protection, as it can be set to slip at any desired load. During starting and overload periods the current draw is at a minimum because with the standard Flexidyne setting the motor is never pulled down to less than 90% of synchronous speed.

All this is due to Flexidyne's completely new principle, which produces *constant torque* for a given input speed, regardless of the percentage of slip between the rotor and housing (which occurs only during starting or overload).

The Flexidyne is simple to select *off the shelf.* Each size has a standard horsepower rating and yet it is only a matter of minutes to vary the flow charge to give you your own *tailor-made torque* to suit the job.

With Flexidyne you get *uniform* performance regardless of changes in the surrounding temperature.

The Flexidyne has very long life and practically negligible maintenance. *Its simplicity guarantees its dependability.* Gas and diesel engines also benefit from all Flexidyne advantages.

Aside from Flexidyne's low first cost, low maintenance, and top efficiency, it permits the use of smaller, cheaper motors and controls with greatly reduced current demands and improved power factor. Its *smoother* starts and *gentler* overload protection avoid breakage and reduce maintenance on drives, gears, bearings and driven machinery.

FLEXIDYNE COUPLINGS

Two lines will be available—*Flexidyne Drives,* for convenient mounting directly on motor shafts and adapted for Dodge Taper-Lock Sheaves, and *Flexidyne Couplings* with Taper-Lock Bushings, for straight line drives. Several thousands of these units of French design, in capacities ranging from fractional to thousands of horsepower, are now in use in Europe. Dodge will first offer — from stock — four sizes rated at 3 to 30 hp at 1800 rpm. Other sizes will follow.

Write now for special bulletin, delivery dates and application information.

DODGE MANUFACTURING CORPORATION
2800 UNION STREET, MISHAWAKA, INDIANA

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.

DODGE
of Mishawaka, Ind.

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B. F. Goodrich announces

easy to install...

"Easy as putting in a pipe fitting"—that's what it's like to install a Yarway Impulse Steam Trap.

No special supports needed, because Yarways are light in weight, small in size—can be squeezed in most anywhere.

Plus these good features:

- **They get equipment hot in a hurry and keep it hot**
- **Good for all pressures**
- **Six standard sizes, ½" to 2"**
- **Long life...body and working parts are stainless steel**
- **Low maintenance . . . only one moving part**
- **Corrosion resistant, non-freezing**

Everywhere users are calling the Yarway Impulse "the little steam trap that does so much." Prove to yourself what it does by trying one for 60 days FREE in your own plant. Write . . .

YARNALL-WARING COMPANY
127 Mermaid Avenue, Philadelphia 18, Pa.

YARWAY

impulse® steam trap

OVER 1,000,000 YARWAYS ALREADY SOLD THROUGH 250 CONVENIENT INDUSTRIAL DISTRIBUTORS

B. F. Goodrich announces

This easy-to-clean belt good for 85% of all food-handling jobs

THAT belt the cake is riding on is the most useful conveyor belt made for the food industry. It's the B. F. Goodrich Highseal, built to handle 85 out of every 100 food-handling jobs, and last longer doing them.

The first thing you'll notice about the Highseal belt is its attractive green color. Lighting experts call it "eye-rest" green because it reduces glare and eyestrain. And the color is not just a thin top coating, it's used throughout the belt and will last as long as the belt itself.

A new rubber compound gives this B. F. Goodrich belt good resistance to food acids, most greases, fats and alkalies. It can handle cold products down to zero, as well as hot ones up to 212°. Food particles can't grind into Highseal's smooth, polished surface. That's why it's so easy to clean. Oily foods, sticky icings, even scuff marks from banging pans, wipe right off with a damp cloth. Many users report that Highseal has cut their clean-up time in half.

Another new belt, developed by B. F. Goodrich for food handling, is the tan Koroseal belt that has the highest resistance to oil and grease of any belt made today. What's more, it stands hard use, rough handling and just about everything else that ruins most materials.

Find out more about these longer-lasting, work-saving belts for food handling. Let your B. F. Goodrich distributor show you samples and give you more information. *The B. F. Goodrich Company, Dept. M-414, Akron 18, Ohio.*

Koroseal—T. M. Reg. U. S. Pat. Off.

B.F. Goodrich
INDUSTRIAL PRODUCTS DIVISION

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DON'T OVERLOOK JOBS THE AXIAL FLOW DOES BEST!

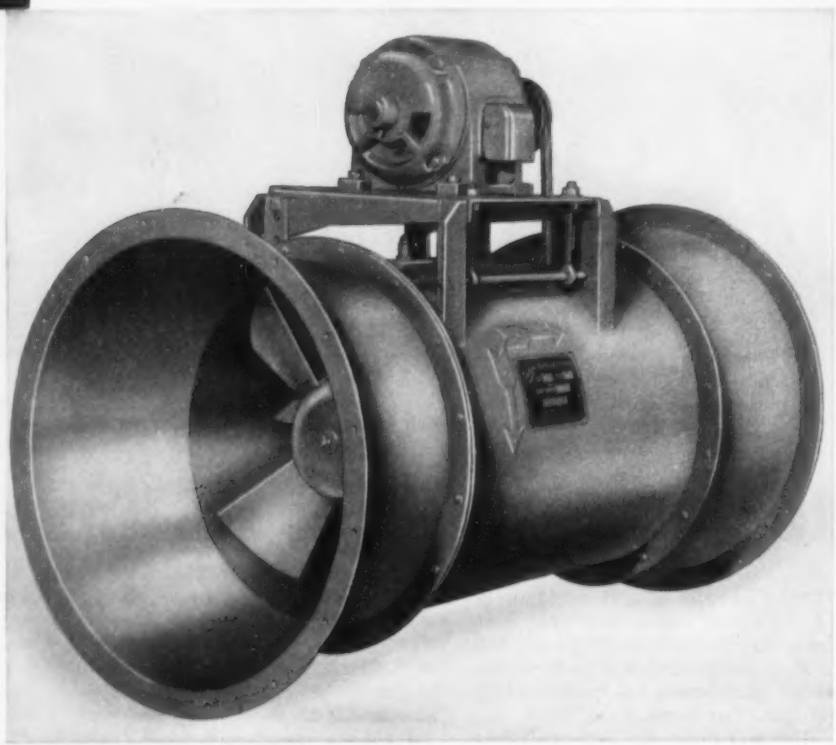
The axial flow fan design offers distinct advantages well worth considering for a growing variety of jobs:

1. STRAIGHT LINE EFFICIENCY. Being basically designed for duct mounting, the axial flow is at its best when mounted in straight duct runs. "Buffalo" Axial Flows are giving excellent service as duct-mounted "boosters" in systems—also as light-duty ventilation, exhaust and industrial air conditioning supply fans.

2. LIGHT WEIGHT. This permits economical installation. In all but the very largest sizes, no heavy foundations or structural support are required. "Buffalo" Axial Flow Fans are often installed as part of the pipe or stack in hood and vat or other roof exhaust systems.

3. SPACE SAVINGS. These duct-size fans fit in close to walls or ceilings. Space-saving applications vary from paint spray booth exhaust to forced draft for cooling towers — from circulation of chilled air in quick freezing to boiler room cooling. Here, high efficiency influences the choice, as well as compact size.

Naturally, all axial flow fans are not alike. When you specify "Buffalo", you are assured of the top performance inherent in the "Q" Factor*. Write today for Bulletin 3553-EF for full details.



Right, "Buffalo" Type "B" Vaneaxial Fan. Outlet guide vanes smooth out air flow for greatest efficiency and quiet operation. Available for high or low temperatures, corrosive fumes, explosive atmospheres, etc.

NOTE: No one fan is the answer to every problem. "Buffalo" builds all types, including broad lines of centrifugal and propeller fans. Full details on request.

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

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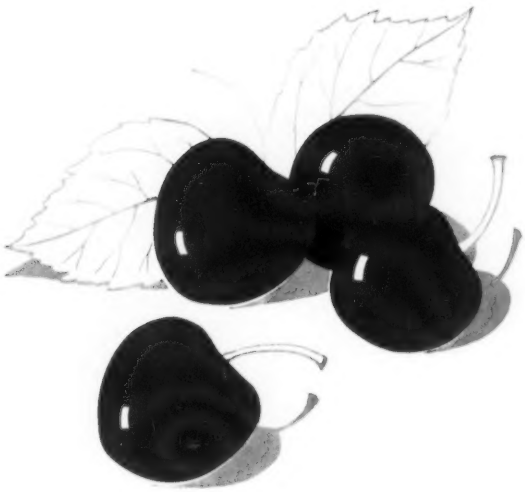

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We manufacture 18 Primary Certified Food Colors and 51 Blends . . . a complete line of 69 shades from which almost any color in the spectrum can be reproduced.

These National Certified Food Colors are produced wholly within our Buffalo plant by men who understand and respect your insistence upon purity. Each is standardized in the strength that our 50-year experience has shown to give most satisfactory results.

For uniformity, solubility and brightness of shade, always specify National Certified Food Colors.

Write for your copy of the informative National Certified Color Catalog giving helpful information on blends for popular food-color shades, suggestions on the preparation and care of stock solutions for various food products and other useful data. No cost or obligation.

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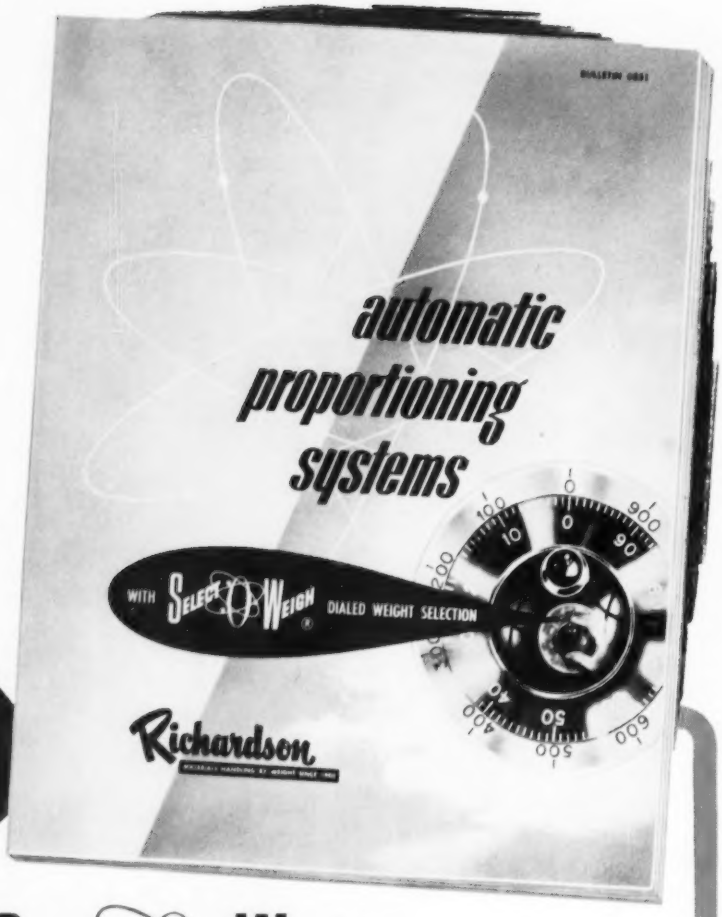

REMOTE DIALED WEIGHT SELECTION BELONGS IN YOUR BUSINESS

THIS NEW FREE BOOK TELLS THE FULL STORY OF

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REMOTE WEIGHT SETTING SYSTEMS

Here are answers to the puzzlers you've had about completely automatic weighing, proportioning and blending. Richardson's new 28-page booklet shows in detail how industries like yours use Select-O-Weigh systems to "dial" as many as 20 individual ingredient weights in formulas.

Many industrial "case histories" and over fifty easy-to-understand diagrams and illustrations take you through Richardson's material-saving, time-saving, labor-saving story of finger-tip formulation which requires no manual changes, even for fractional proportions. Send for this free booklet today. See how a Select-O-Weigh system—developed out of Richardson's 50 years of experience in building automatic weighing, proportioning and blending equipment—can solve countless problems in your change-over from conventional weighing and proportioning methods to automation.

Write today for your free copy of Bulletin 0351.

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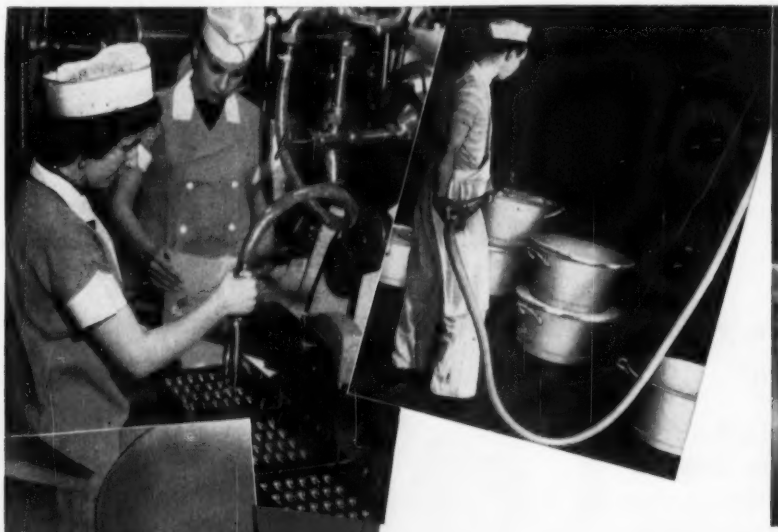

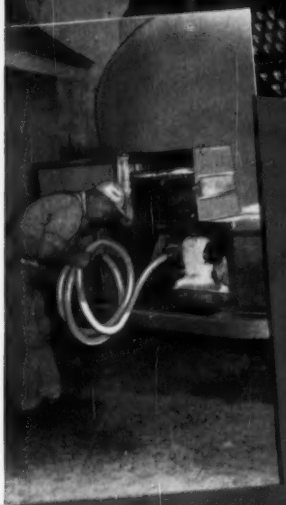

Pipe liquid foods safely through *clear · flexible* TYGON PLASTIC TUBING

Less expensive than stainless steel, corrosion-resistant TYGON combines the best features of both rubber and glass *without* the disadvantages of either . . . the perfect piping for transmission of liquids or semi-solids!

Even the most sensitive foods as milk and ice cream are handled safely by chemically inert, non-toxic TYGON, without loss of taste or color. And flexible TYGON gives you the *solution visibility* of clear glass, without danger of breakage, cracking, or crazing. You have complete visual control of flow . . . a quick glance instantly tells you the level of your process material.

Fully flexible TYGON reaches from "anywhere to anywhere" — with less fittings, and less installation time. Lightweight, strong and abrasive-resistant, TYGON is a "natural" for your portable hose or tubing applications.

- MILK
- PIE FILLING
- ICE CREAM
- MERINGUE

TYGON CUTS MAINTENANCE COSTS IN HALF!

A TYGON line can be dismantled, cleaned, and reassembled in minutes. TYGON'S mirror smooth surface flushes easily clean. There is no crazing or checking to harbor bacteria. Strong detergents and cleaning chemicals leave it unaffected. It can even be steam sterilized, if desired.

TYGON TUBING comes in continuous lengths and in various sizes up to 2" I.D. Also available with braided reinforcement of stainless steel or fabric for pressures up to 300 psi.

U. S. STONEWARE
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PLASTICS AND SYNTHETICS DIVISION

225-D

WRITE TODAY for Bulletin T-87 which gives you full particulars on money-saving TYGON Tubing.

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FIRST instrument system BASIC GRAPHIC-PANEL

It's BRISTOL'S new metagraphic instrument system

A WIDE SELECTION: For example, there are 35 receiver and 34 controller models and the widest variety of transmitters on the market. A model can be found among these that will exactly meet any requirement.

FULL PLUG-IN SERVICE: Change recorder to an indicator or vice versa in 10 seconds with ABSOLUTELY NO INTERRUPTION WHATSOEVER TO AUTOMATIC CONTROL.

Pull complete chassis out (one piece chassis — no tools required). With chassis removed you get the same automatic control as before.

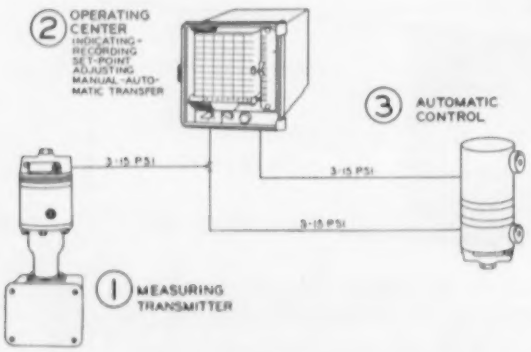
Change from one model to another or if trouble is suspected in a plug-in unit, the doubtful unit can be replaced by a spare while the suspected unit is checked in the service shop — out-of-service time is thus eliminated.

CONTINUOUS VALVE POSITION INDICATION on *same instrument scale as set point scale*, gives continuous data on control valve position—makes "bumpless" transfer possible, simply by matching pointer positions — no need to read actual scale values — minimizes reading errors — speeds operations.

METAGRAPHIC TRANSMITTER

SUPPLIED IN A VERY WIDE VARIETY OF SPANS AND RANGES: For example, absolute pressure instruments are made in ranges as low as 5mm mercury absolute. Pressure instruments as low as 5 inches water to 10,000 psi. Over-range protection available up to 400% over range.

STANDARD BRISTOL MEASURING ELEMENTS ARE USED — high torque, wide-angle travel gives powerful, positive operation. Very sensitive — as little change as 0.03% of range, including reversal.

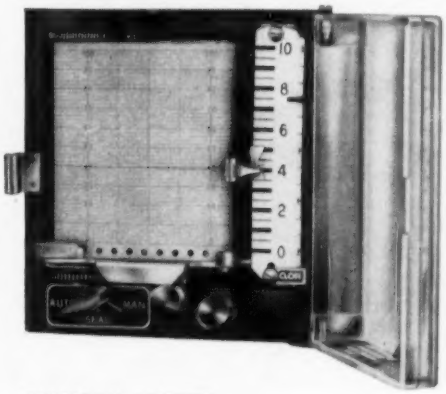


METAGRAPHIC INSTRUMENTS MEASURE, RECORD, INDICATE, AND AUTOMATICALLY CONTROL

Pressure	Liquid Level
Vacuum	Flow
Absolute Pressure	Temperature and
Differential Pressure	Mechanical Motion

For more information, use coupon on last page.

that carries out idea completely!

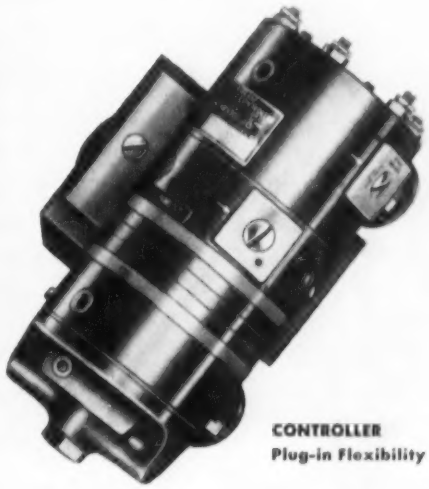


RECORDING RECEIVER:
Also furnished as an Indicator

NO INTERRUPTION WHATEVER TO AUTOMATIC CONTROL when receiver chassis is removed. The chassis of a Metagraphic Receiver is plug-in construction and can be changed from a recorder to an indicator or back in a matter of 10 seconds.

OFFERED FOR UP TO 3 MEASURED VARIABLES — with air pressure regulators or air-loaded regulators — three-position manual-automatic transfer valves for automatic control and *six-position (on the same knob) transfer valves for cascaded control.*

ALL MEASUREMENTS ON SAME SCALE PLATE: Deviation of pointers shows at a glance conditions of control — no need to read scale.



CONTROLLER
Plug-in Flexibility

VARIETY AND FLEXIBILITY: The most flexible and complete line of controllers offered — 34 different models, including the following variations:

1. Remote set-point
2. Integral set-point (with or without air-loading)
3. Pipe-connected
4. Plug-in receiver mounted
5. Plug-in pipe or surface mounted
6. Five models of control action as follows:
   a. On-Off
   b. Adjustable proportional
   c. Adjustable proportional plus reset
   d. Fixed proportional plus reset
   e. Proportional plus reset plus rate (derivative)

Write for our product data sheets. The Bristol Company, 115 Bristol Road, Waterbury 20, Conn.

6.5.2

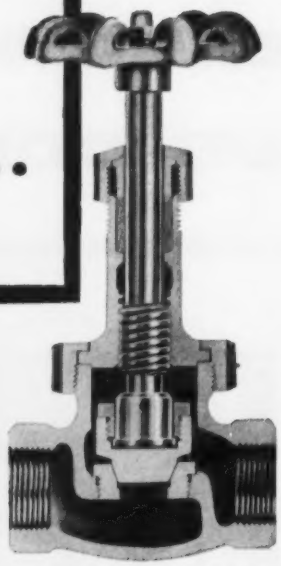
BRISTOL'S

BRISTOL

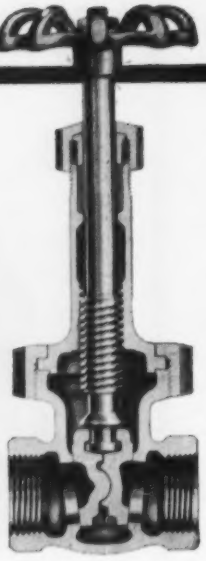
POINTS THE WAY IN HUMAN-ENGINEERED INSTRUMENTATION

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

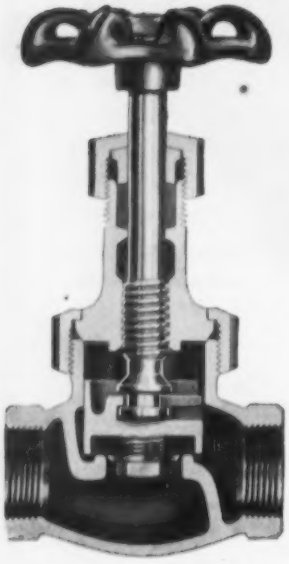
Walworth bronze valves...



Walworth No. 225P Globe Valve
500 Brinell Seat and Disc



Walworth
No. 29 Gate Valve



Walworth No. 95 Globe Valve
Re-New-Disc

built to give dependable trouble-free service on all recommended jobs

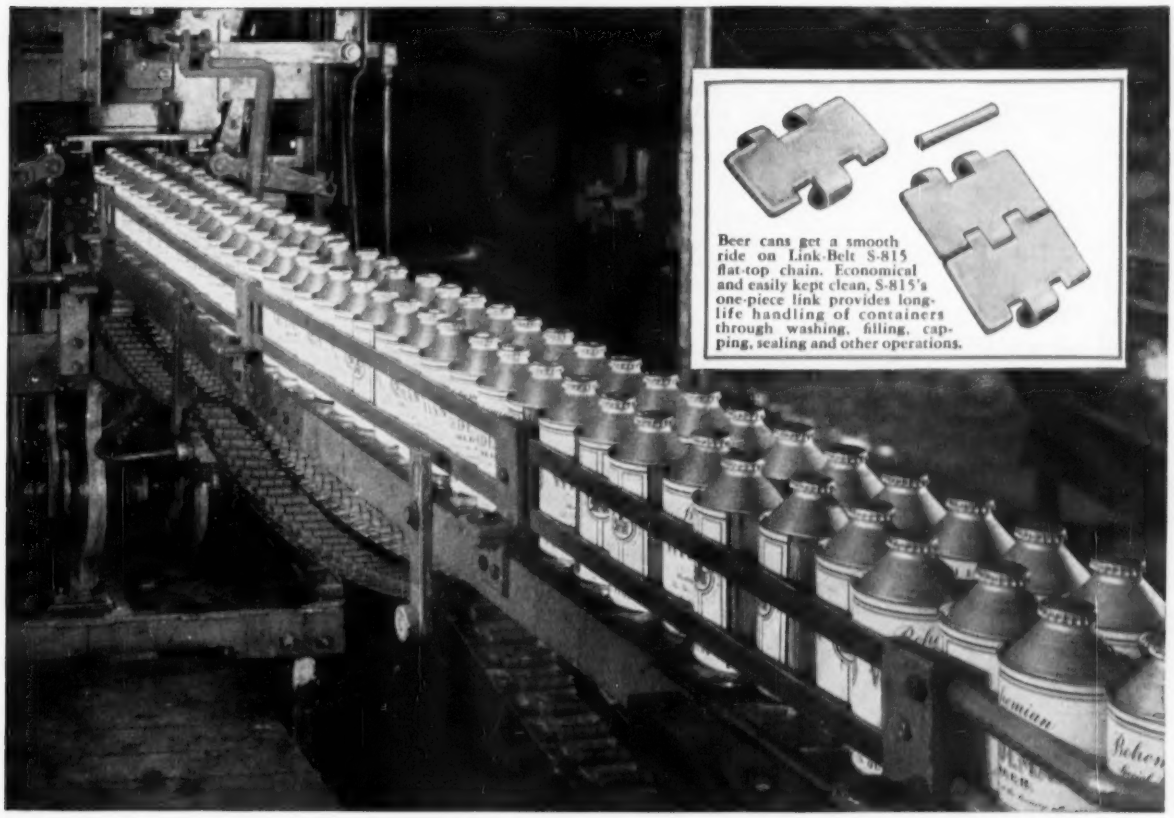
Walworth No. 95 Bronze Globe Valves (Angle Type: No. 96) are recommended for service where throttling is not required. They are rated at 150 psi working steam pressure, 500F; 300 psi cold water, oil or gas. The improved renewable disc and lock-on, slip-off disc holder — an original Walworth development—saves time and trouble. This valve can be repacked under pressure when fully opened. All parts are designed to give maximum service and strength.

Walworth No. 29 Bronze Gate Valves are rated at 200 psi working steam pressure, 550F; 400 psi cold water, oil and gas. These valves have rising stems and integral seats. Sizes 2-inch and smaller have union bonnets; sizes 2½ and 3-inch have bolted bonnets. Valves up to and including ¾-inch have solid wedge discs; 1-inch and larger have split wedge discs. These valves can be repacked under pressure when fully opened.

Walworth No. 225P Bronze Globe Valves (Angle Type: No. 227P) are rated at 350 psi working steam pressure, 550F; and 1000 psi non-shock service on cold water, oil and gas. The stainless steel, plug type seat and disc — heat treated to 500 Brinell — can be closed on sand, slag, scale and similar floatage, without injury to the seating surfaces. They are the longest wearing, TOUGHEST bronze valves you can buy.

For full information about Walworth Quality Bronze Valves, see your Walworth distributor, or write:

WALWORTH
valves and fittings
60 EAST 42nd STREET NEW YORK 17, N. Y.



Beer cans get a smooth ride on Link-Belt S-815 flat-top chain. Economical and easily kept clean, S-815's one-piece link provides long-life handling of containers through washing, filling, capping, sealing and other operations.

Here's a smooth-operating, flat-top conveyor chain... moderately priced

LINK-BELT offers the chain that's best for every job

THE many varied drive and conveying jobs performed by chains and sprockets require different physical characteristics. The S-815 flat-top conveyor chain is an example of how Link-Belt builds a type and size for every purpose.

In addition, every chain in the complete Link-Belt line is built for longer life. Rigid control of raw materials and manufacturing processes is your assurance of uniformity.

For all the facts on S-815 flat-top conveyor chain, ask for Folder 2344. And for information on the complete Link-Belt chain line, see your nearest Link-Belt district sales representative.

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle; Scarboro, Toronto and Elmira, Ont. (Canada); Springs (South Africa); Sydney (Australia). Sales Offices in Principal Cities.

LINK-BELT

CHAINS AND SPROCKETS

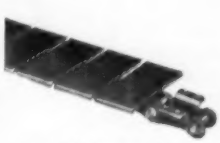
13,328

No one chain serves every purpose . . . get the RIGHT one from Link-Belt's complete line

Class RC crescent flat-top chain—travels in horizontal planes, around corners; ideal for bottles and cans.

Malleable roller chain for conveyors or inclined elevators where reduced chain pull is desired.

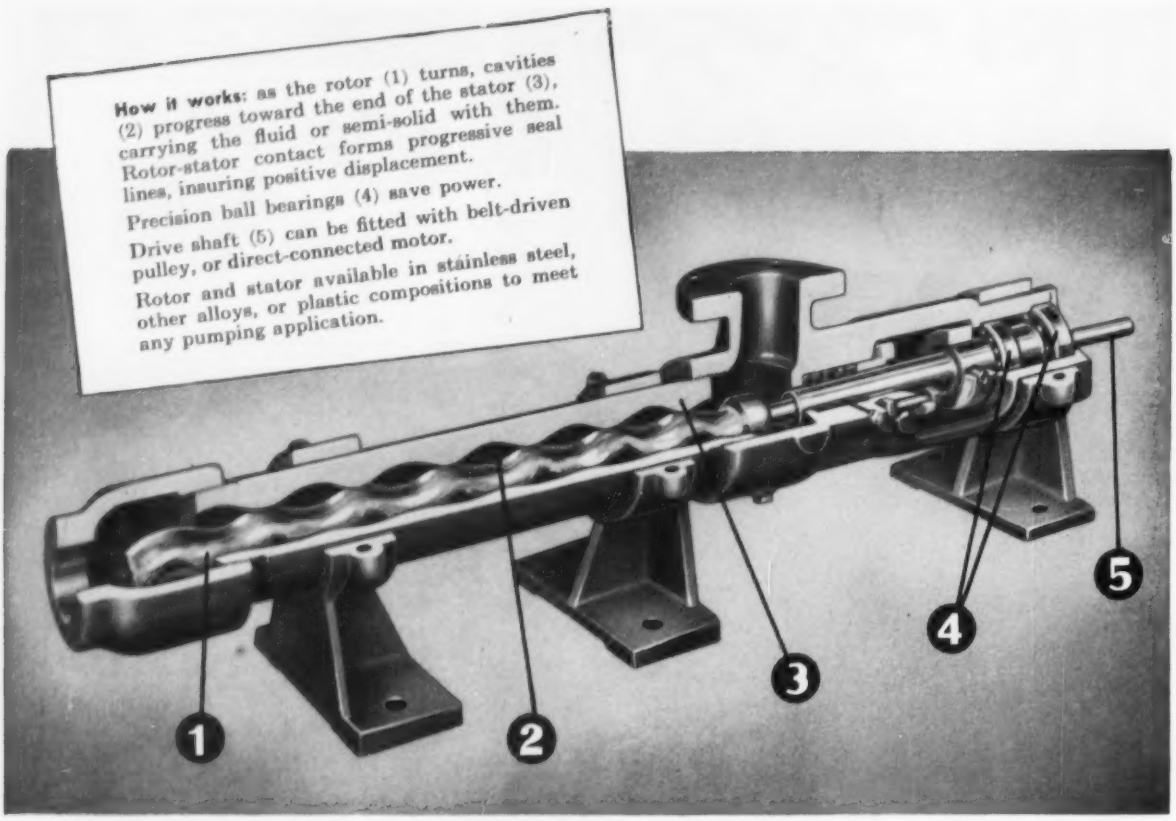
Class 400 swivel chain—carries cartons, cases, etc. over paths with both vertical and horizontal turns.



Class RC flat-top chain—precision made for smoothest, spill-free carrying and long life.

Class RC universal crescent flat-top chain can be used for multiplane operation traveling variety of paths.

For more information, use coupon on last page.


How it works: as the rotor (1) turns, cavities (2) progress toward the end of the stator (3), carrying the fluid or semi-solid with them. Rotor-stator contact forms progressive seal lines, insuring positive displacement.
Precision ball bearings (4) save power.
Drive shaft (5) can be fitted with belt-driven pulley, or direct-connected motor.
Rotor and stator available in stainless steel, other alloys, or plastic compositions to meet any pumping application.
1
2
3
4
5

If your pump requirements are a little different...

The entirely different MOYNO® Pump may be exactly what you need!

You name the problem! Are your pumped materials viscous, semi-solid, hard to move? Do they tend to disintegrate? Are they abrasive? Do pump maintenance costs seem high? If "yes" is the answer to any of these, find out why Moyno Pumps handle jobs where other pumps fail!

The Moyno is different! The cut-away view above—and the facts listed at left—describe a completely new concept of pump design. They show why the Moyno is a pump you can specify, install and *forget*.

Will it solve your problem? Chances are it will . . . at least there isn't a more versatile pump made! Moynos pump clay for a leading pottery maker. They're being used for handling white water in paper mills . . . for caustics . . . an Eastern food producer is even using them successfully for pumping potato salad!

Get more facts today! An interesting, factual bulletin will tell you more about the simple, versatile Moyno Pump. Write for your free copy of Bulletin 30-FE.

FACTS ABOUT THE MOYNO

the world's simplest pump

- **Positive Displacement**—Moynos are available to pull up to 29 inches of vacuum while discharging under pressure. Big Moynos can deliver up to 250 gallons per minute, against pressures up to 600 p.s.i.
- **Gentle**—no churning, foaming; won't break up semi-solids.
- **Reversible**—pumps with equal efficiency in either direction.
- **Trouble-Free**—self priming; won't cavitate or vapor-lock. Just one moving part—no valves to stick, no pistons to gum up. Built for tough service, easy to maintain.
- **Versatile**—handles liquids, pastes, abrasive-laden slurries, vacuum applications.

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Electric Fans

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Moyno Pumps

Propellair Industrial Ventilating Equipment

This raspberry is ready to do your biggest flavor job

Come to Norda now,
for your very fine flavors.

Norda Flavors have a new, highly concentrated richness. All the characteristics of the true natural fruit—and its notable Norda imitations—are *in-blown* by special advanced Norda processing methods.

In-grown, long-lasting flavor results. You can delicately and easily vary its strength. You get taste that stays natural. You get *real* quality.

Sample Norda's exciting *in-blown* Flavors *free*, by requesting on your letterhead.

Use "A Favorite to Flavor It"—from

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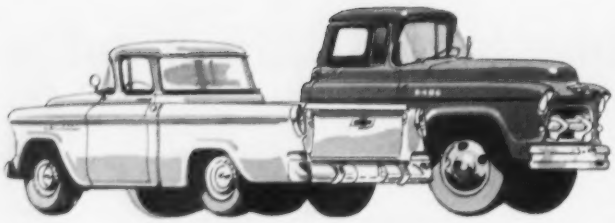
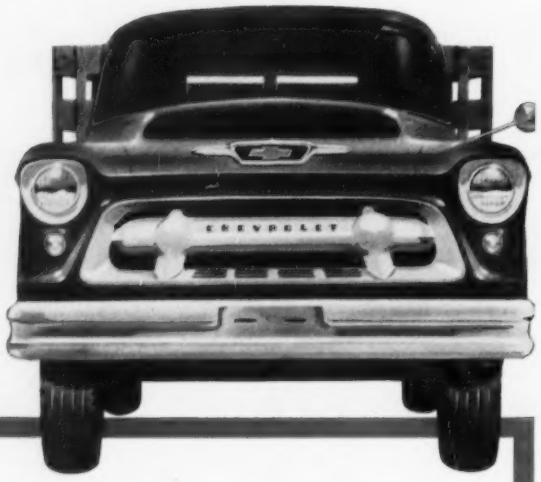
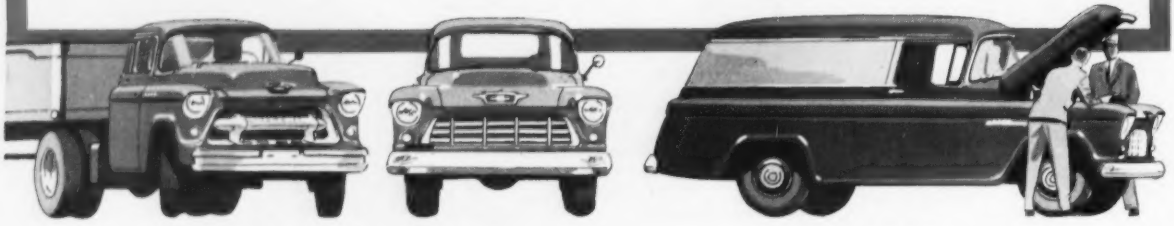




NEW CHEVROLET *Task-Force* TRUCKS

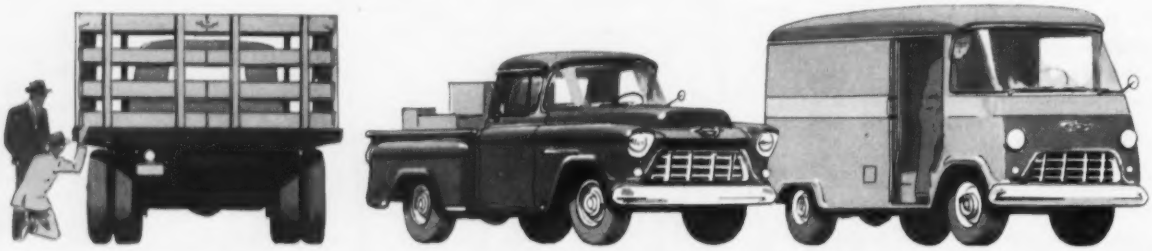


A new kind of truck styling

It's Work-Styling—an exclusive development in truck design with two distinctively different styling treatments. On the job, your truck "looks the part" and becomes a profitable advertisement on wheels for you and your business.

New "high-voltage" engines

Six of them! Each with a modern 12-volt electrical system for surer year-round starts and increased generator capacity—plus a long list of other new advances. They're the last word in smooth, quiet and thrifty truck power.

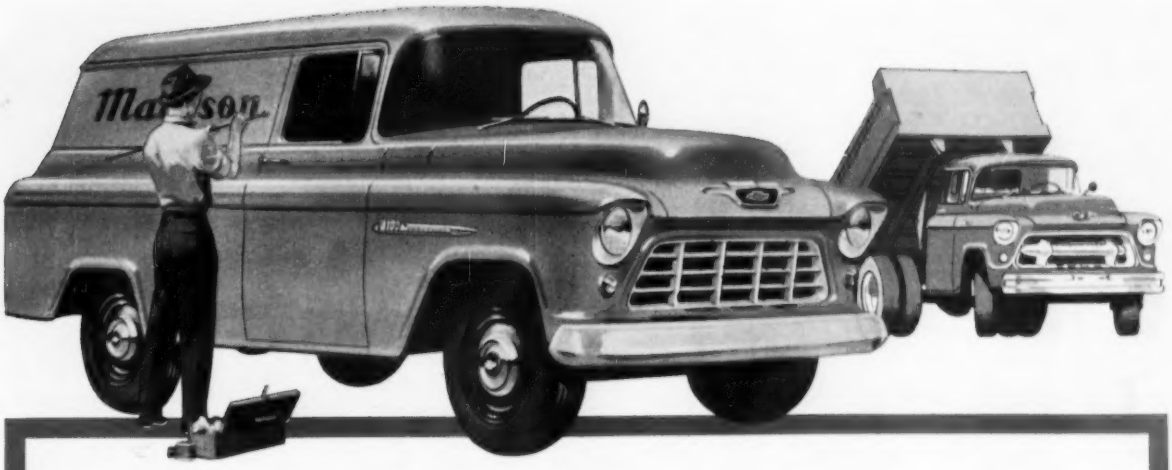


New frames of standard width

All models now have new ladder-type frames with full-length parallel side members for greater rigidity and longer truck life. Now, too, these newly designed Chevrolet frames are all 34 inches wide to accommodate special body installations.

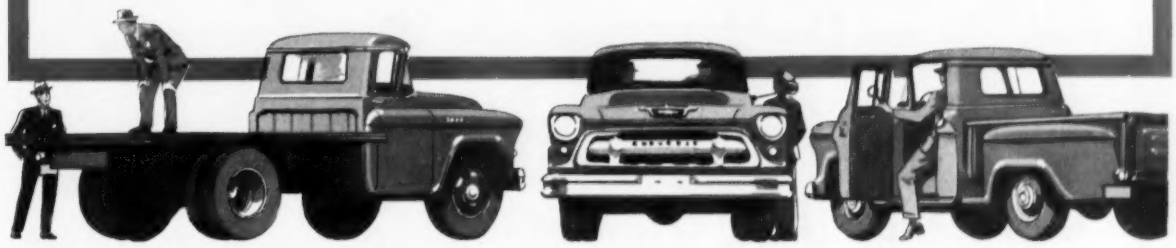
New Overdrive—Truck Hydra-Matic

For even bigger gas savings and less engine wear, new Overdrive is available on all ½-ton models at extra cost. Hydra-Matic, Chevrolet's thrifty automatic truck transmission, is optional on ½-, ¾- and 1-ton models at extra cost.



CHEVROLET

They're setting the pace for the whole industry! Take a good look at them here... in the showroom . . . on the road. It won't take you long to discover that these are the most modern trucks on any job.

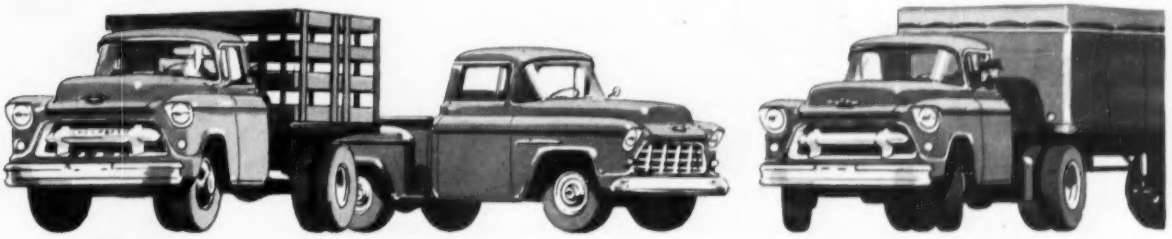


New 18,000-lb. G.V.W. capacity

The highest ever for Chevrolet! And that's good news for everyone with heavy hauling to do. For with this hefty hike to 18,000 pounds Gross Vehicle Weight, Chevrolet brings its famous economy and dependability to new heavy-duty fields.

A cab as new as the view

New Sweep-Sight windshield—plus more glass all around—for a wider, safer view. New High-Level ventilation for greater driver comfort. New softer seats. New, more durable cab construction. New concealed Safety Steps that stay clear in all weather.



Power Brakes standard on 2-ton models

This great power helper increases driving safety . . . reduces driver effort. You stop with up to one-third less pedal pressure—and you do it right now! Chevrolet Power Brakes are standard equipment on 2-ton models —optional at extra cost on all others.

There's more to tell, a lot more

Stop in and let your Chevrolet dealer give you the complete "all-new" story. There are many more good things to discover about the New Chevrolet Task-Force Trucks! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

For more information, use coupon on last page.

Whether it's a corn syrup for fruit

GLOBE

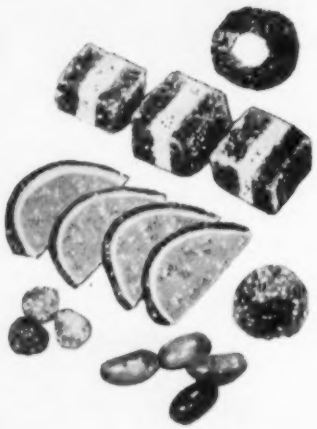
or for fondants, hard candies, marshmallows, soft centers, ices, ice creams, sherbets, cakes, frostings, pies, fillings, cookies, sweet goods . . .

Whether it's a corn sugar for bread

or for catsup, chili sauce, tomato paste, canned fruits, smoked meats, soft drinks, gelatin puddings, candies, jellies, juices, preserves . . .

Whether it's a corn starch for candy

or for cookie doughs, wire cut goods, canned corn, marshmallows, pie fillings or use on the mogul . . .



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Corn Products Refining Company to provide you with ingredients made specially to meet your needs. Our technical staff is at your service without obligation.

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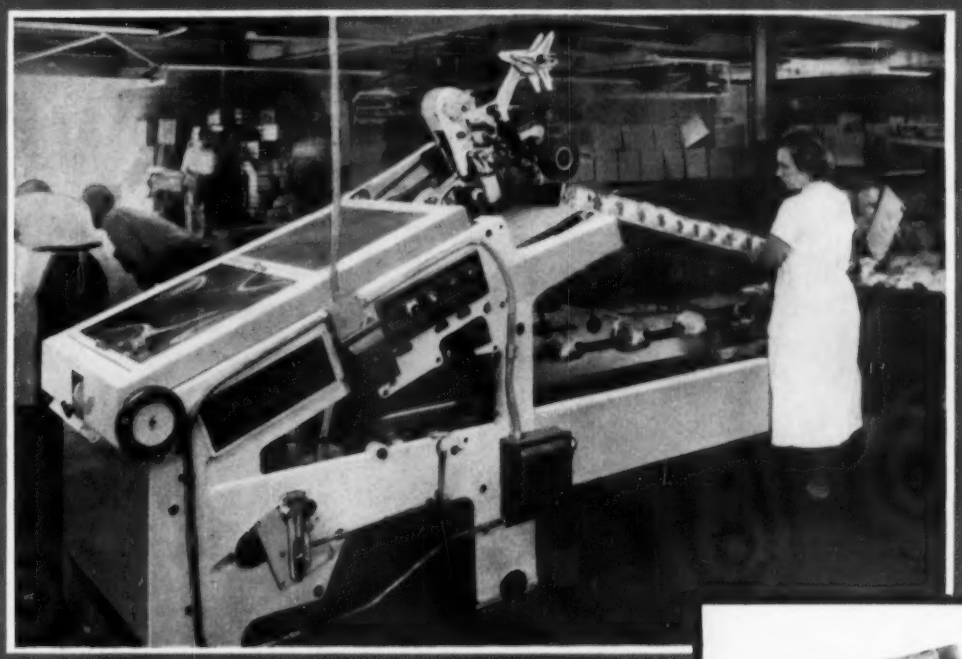

Get set for New Profits . . .

PREPACKAGE YOUR PRODUCE!

Fill trays with anything from lettuce to peaches to corn-on-the-cob to salad mix. Machine-wrap the trays with a film-type overwrap. Display them beside "loose" produce, then watch what happens. Shoppers reach for the pre-packaged items every time!

There's no mystery about it. Pre-packaged produce looks better, keeps better, sells faster. And there's no better machine for pre-packaging than the Universal 6. It's a one-operator machine—wraps up to 40 packages a minute in trays or cartons! Widest size range: 4" to 16" long, 2" to 9½" wide and ⅜" to 5¼" high! Quickest adjustability: self-measuring paper feed automatically adjusts to package changes in width and height. Other changes by handwheels.

Sell more produce and make more money doing it. Our nearby representative will gladly tell you how the Universal 6 can put a new look in your profit picture.

PACKAGE MACHINERY COMPANY

EAST LONGMEADOW, MASSACHUSETTS

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CANNING COMPANY CUTS PRODUCTION COSTS WITH

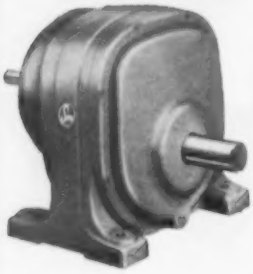
STERLING SLO-SPEED!

Plant Supt., V. Rubino, reports that San Jose Canning Co. has effected many plant economies resulting from the following advantages of Slo-Speeds... Slo-Speeds provide the gear reductions required by our machinery... they require less mounting space and allow easier installation of other equipment in the line... totally enclosed gearing eliminates corrosion of outside bearings, gears and shafts exposed to steam and water... Slo-Speeds permit easier, more systematic lubrication, require less maintenance.

STERLING SLO-SPEED GIVES YOU THE ONE BEST LOW SPEED AND

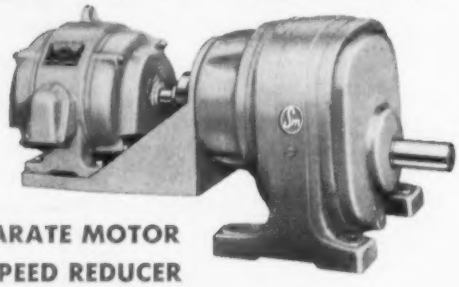
gives uninterrupted service—carries heavy overhung loads—provides versatile mounting and flexibility in arrangement of machinery—saves valuable space—provides greater safety—costs less to install and use. An indispensable source of low speed power for:

Agitators	Dryers	Presses
Blenders	Feeders	Pumps
Blowers	Kilns	Screens
Conveyors	Mills	Tumblers
Cookers	Mixers	Etc., etc.



MULTI-MOUNT REDUCER

Available with feet or footless, face or flange mounted.



SEPARATE MOTOR SLO-SPEED REDUCER

For applications where separate motor reducer combinations are desirable.

WRITE FOR Application Bulletin showing how Sterling Electric Power Drives increase production efficiency and reduce costs. Ask for Bulletin No. 201-A

STERLING ELECTRIC MOTORS

Plants: New York City 51; Chicago 35; Los Angeles 22; Hamilton, Canada; Santiago, Chile

Offices and distributors in all principal cities

"Another Product Safely Shipped in Inland 'protection-ered' Containers"*

MAKING COCONUT OIL FEEL AT HOME

Nature's package for coconut oil in the raw state is just about perfect . . . tough and sanitary.

But packaging *refined* coconut oil is another matter. Fatty acids in the oil react with steel to cause contamination and discoloration. Yet steel containers are most practical and economical.

In licking this problem for The Best Foods, Inc., a leading processor of vegetable oils, Inland Steel Container specialists managed to duplicate, and even improve upon, Mother Nature's packaging with a steel container that has: (1) a special sanitary lining that eliminates all possibility of contamination, (2) an attractive, functional design together with rigid construction that takes even severe handling in stride, (3) a simple, efficient cover that's not only more airtight and leakproof than a coconut but much easier to open.

The Best Foods, Inc. specifies Inland containers with special sanitary linings for their Nucoline brand coconut oil. They've found through years of satisfactory shipping of many products that Inland containers can be depended on to deliver the same high quality they maintain so carefully in production.

If you'd like to find out how steel packaging by experts can insure quality-on-delivery and save you money too, write today to Mr. Robert Boecher, Room 243-D.

"It's better to ship in steel."

**the right container, with the right lining for your products.*

INLAND STEEL CONTAINER COMPANY
Division of Inland Steel Company
6532 South Menard Avenue • Chicago 38, Illinois
Plants: Chicago • Jersey City • New Orleans

Practical service training at Honeywell's school . . .

makes your instrument men more valuable

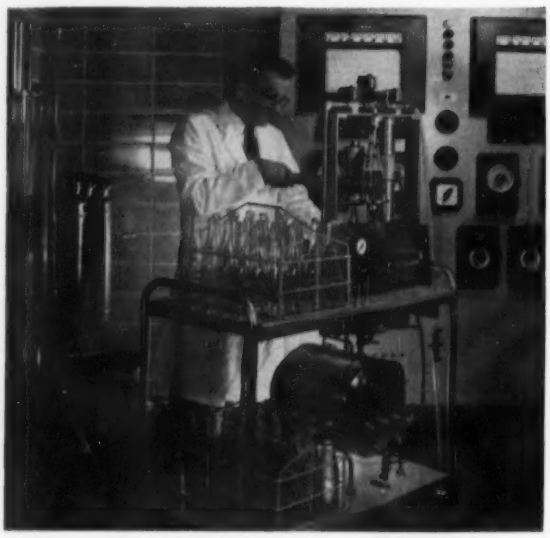
Your instrument maintenance men can get a real education in the most up-to-date methods for servicing instruments, at Honeywell's Training School. Any organization which uses Honeywell instruments can send maintenance personnel to this school. Tuition costs you nothing, for this school is maintained as a "plus-value" service to Honeywell customers.

Thousands of technicians have either started or augmented their instrument knowledge here. A variety of courses is available, to fit men for the particular kind of maintenance problems they may encounter in their specific jobs. The comprehensive course . . . one of the most complete and intensive offered anywhere . . . covers about thirteen weeks. Other courses cover five weeks and less, to offer condensed instruction of either a basic or "refresher" nature to men who can't be spared for extended periods.

There's nothing academic about this school. The emphasis is placed on practical knowledge. Theory through lectures and textbook study is liberally supplemented by laboratory sessions and actual bench work on all types of instruments and related equipment.

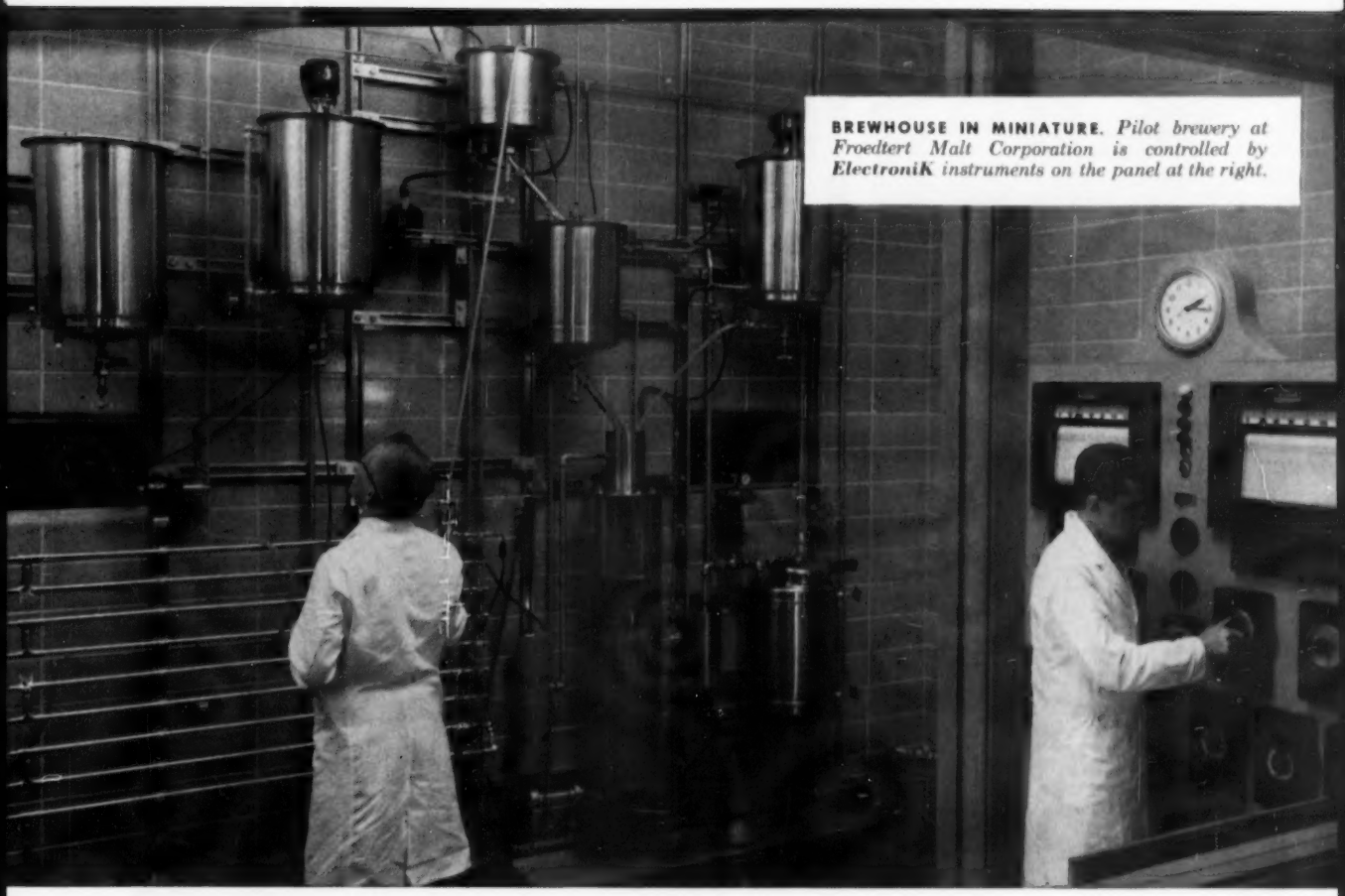
One caution: classes have to be limited to assure thorough attention to all students, so make reservations in advance. Your local Honeywell office will be glad to make arrangements. Call today . . . it's as near as your phone.

*Electronik** instrumentation speeds malt



Portable bottling unit in the laboratory is typical of the pilot-scale duplication of production equipment used in malting research.

PURITY N.S.G.



BREWHOUSE IN MINIATURE. *Pilot brewery at Froedtert Malt Corporation is controlled by ElectroniK instruments on the panel at the right.*

research in unique pilot brewery

AT THE Froedtert Malt Corporation in Milwaukee, a pilot-scale brewery makes beer by the ounce . . . in order to find new and better ways to make it by the thousands of barrels. An important part of the laboratory techniques used in this malt research program is precise, automatic measurement and control of processing variables.

To fulfill this vital function, the laboratory uses a pair of *ElectroniK* instruments that would be equally at home in a full scale brewery. The instruments are wired so that they can be assigned to whatever phase of the brewing process is under study at the moment. One of them is a program controller, which works with a series of adjustable cycle timers to provide fully automatic, reproducible time-temperature schedules. Cooker and mash tub temperatures, for example, can be maintained at precisely controlled heating, holding and cooling rates if desired, just by making a few simple settings on the instrument panel. Similarly, the complete mashing or pasteurizing schedule can be placed under automatic time cycle control with far greater precision than human operators could attain.

The second *ElectroniK* instrument is an all-purpose recorder of test data. It can chart the rate of wort run-off . . . temperature of wort . . . and other variables detected at various points in the process.

For research men, this installation typifies the extent to which accurate, automatic instrumentation by Honeywell can assume routine burdens of test supervision and data gathering . . . leaving technologists free for more complete utilization of their special skills. For production men, it points to some of the ways that modern instrumentation can safeguard both the quality and efficiency of process operation.

Your local Honeywell sales engineer will be glad to discuss how *ElectroniK* instruments can benefit your research or your production processes. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

● **REFERENCE DATA: Write for Catalog 1531, "*ElectroniK* Controllers."**

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

*Trade mark of the Minneapolis-Honeywell Regulator Company.

PURITY® NCS

A New Starch Thickener Reduces Weeping or Separating

pack corn today

CREAM STYLE

ship tomorrow

PURITY NCS for cream style corn reduces weeping or separating during long shelf life. The consistency changes very little even after six months' storage.

PURITY NCS cooks at a higher temperature than regular corn starch. It gelatinizes only partially in the kettle. Complete cooking takes place on retorting with little breakdown. It offers unusual resistance to retrogradation when stored at normal temperatures.

All of which means that the corn you pack today may be shipped tomorrow . . . *at considerable rehandling and inventory savings to you!*

PURITY NCS is also ideal for soups, sauces and gravies.

National STARCH PRODUCTS

Address: 270 Madison Ave., New York 16

3641 S. Washtenaw Av., Chicago 32 • 735 Battery St., San Francisco 11 • Boston • Philadelphia • Atlanta • Houston • Indianapolis • and other principal cities.

CLEARJEL® is a modern stabilizer with an old fashioned way with canned fruit pie fillings. There is no interfering with nature. Sun ripened fruit colors sparkle in clear, smooth, creamy textured fruit juices. Fruit flavors have orchard freshness.

CLEAR JEL

For Canned Fruit Pie Fillings

CLARITY · STABILITY

We'd like to talk with you about:

- ☐ **PURITY NCS** for cream style corn
- ☐ **CLEARJEL** for canned fruit pie fillings
- ☐ **FLOTEX** for processing at lower temperatures
- ☐ **PURITY SDW** for processing at extremely high temperatures

What's your container,

and how fast do you want to fill it?

IF your product has consistency that falls anywhere between evaporated milk and potted meat, here's a way to boost the filling speed of nearly all tins, jars and composition containers.

You can turn out as many as 800 cans a minute—sometimes even more—with Pfaudler Rotary Piston Fillers. Five standard models are available to handle sizes from 1 ounce to an imperial gallon.

1/10-oz. accuracy

Depending on your product and size of container, you get accurate filling to very small tolerances—as little as plus or minus 1/10 of an ounce!

And you are able to adjust the amount of fill quickly by hand, without even turning the machine off.

One-man cleaning

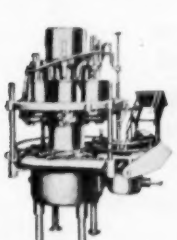
Working alone, one man can clean a Pfaudler Filler thoroughly in about 30 minutes. He needs no tools, and the only parts he must remove are the valves and pistons, which slide out.

60 to 800 cans per minute

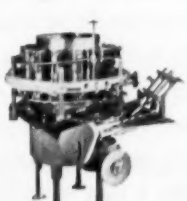
Select the filling speed best suited to your own production needs. On the table below, model number indicates pistons (RP-6 has 6 pistons, etc.).

FILLER	DIA. OF CONTAINERS HANDLED	RATED SPEED (containers per min.)
RP-6	202 to 404	60 to 175
RP-7	401 to 700	40 to 100
RP-14	202 to 404	150 to 400
RP-21	202 to 303	250 to 600
RP-35	202 to 303	to 800 (has operated at more than 1000)

If it's filling speed you want, plus a chance to cut the cost of buying, maintaining and cleaning equipment—mail the coupon or call in your Pfaudler representative today.



FOR BIG CONTAINERS, Model RP-7 has typical Pfaudler convenience features, handles capacities up to 5 quarts.



14-STATION FILLER, Model RP-14, has no-can-no-fill device, as do all four other Pfaudler filling machines.

"WORLD'S FASTEST FILLER," RP-35 has special features, including electric brake that stops rotation in 2/10 of a second.

Pfaudler

THE PFAUDLER CO., Dept. FE-5, Rochester, N. Y.

☐ Please send me Bulletin 911, "Rotary Piston Fillers."

☐ Please send a representative to discuss my filling problem.

Name _____

Title _____

Company _____

Address _____

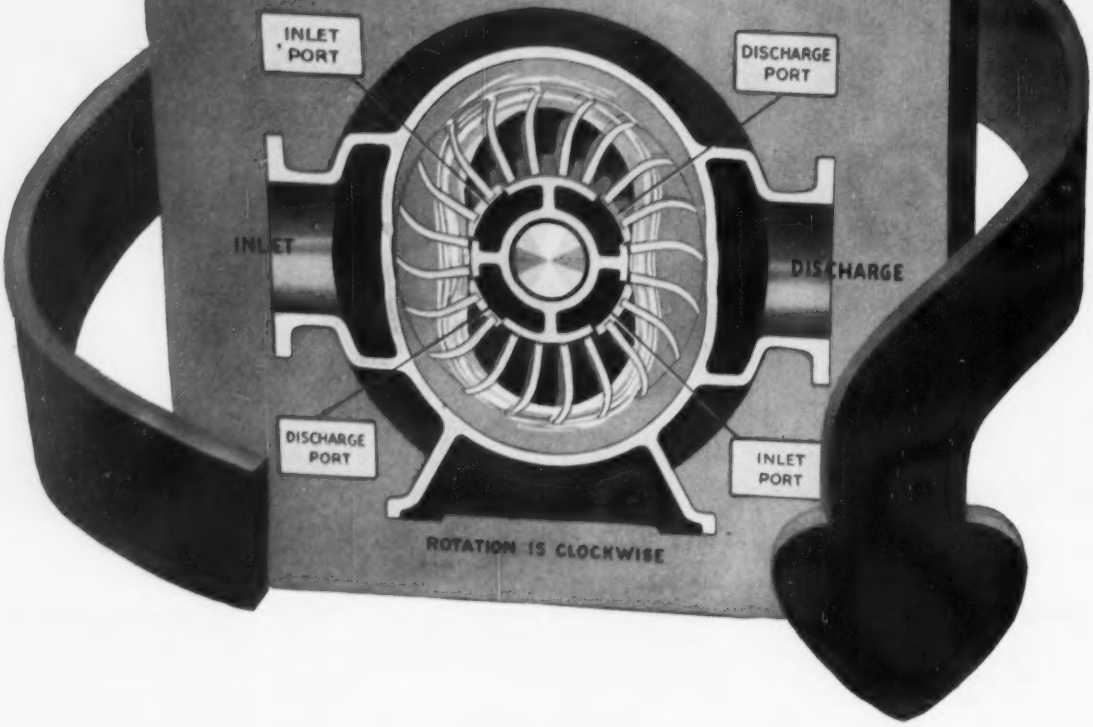
City _____ Zone ____ State ____

THE PFAUDLER CO., ROCHESTER 3, N. Y.

For more information, use coupon on last page.

How shock and vibration

Nash Instrument Air Compressors deliver only clean air, free from oil or dust, and without filters



Here is Why!

You can dispense with oil filters and dust filters when you install ®Nash® Clean Air Compressors. You can save the cost of maintaining these devices. You can greatly reduce instrument maintenance costs. For the Nash employs no internal lubrication, therefore no troublesome oil is in the delivered air. Moreover, air from a Nash is thoroughly washed and cooled as it passes thru the pump. Dust in the plant atmosphere, even fly ash, is immediately removed.

®Nash® Clean Air Compressors are simple, with only one moving element. No valves, gears, pistons, sliding vanes, or other enemies of long life and constant performance complicate a Nash. No aftercoolers are needed. You will find it profitable to investigate these pumps, now.

No oil filters.
No dust filters.
No internal lubrication to contaminate air handled.
No internal wearing parts.
No valves, pistons, or vanes.
Non-pulsating pressure.
Original performance constant over a long pump life.
Low maintenance cost.

NASH ENGINEERING COMPANY
395 WILSON, SO. NORWALK, CONN.

TYPE F
STEELFLEX
COUPLING

- Any Size
- Any Service
- Any Application, Horizontal or Vertical
- Always available

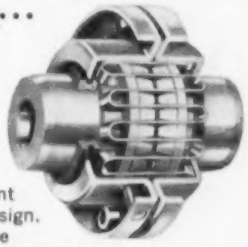
The exclusive grid-groove design of FALK Steelflex Couplings protects your machinery in two ways

You get double protection when you connect your driving and driven machinery with a Falk Steelflex Coupling—the all-steel-built coupling with the exclusive grid-groove design! First, its torsional resilience smothers shock and vibration; and second, the Steelflex design prevents damage and lowered efficiency by accommodating shaft misalignment.

Why have increasing numbers of key men in industry standardized on Falk Steelflex Couplings? Their experience has proved that Falk Steelflex Couplings prolong the service life of their machinery...are trouble-free and need minimum maintenance...are easy to install, lubricate and disconnect ...and cost less per year of service than ordinary couplings.

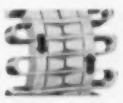
One basic Steelflex design—the Type F, in its many sizes—is adaptable to more than 90% of all industrial applications. This facilitates buying, as well as prompt replacing and servicing when necessary. Write to Department 247 for engineering bulletin, including selection and dimension details.

How shock and vibration are smothered by the FALK Steelflex Coupling's Torsional Resilience...

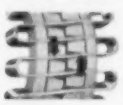


This cutaway view shows the sturdy all-steel construction, also the exclusive, torsionally resilient grid-groove design. Here is how the grid-groove design functions:

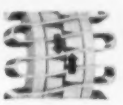
UNDER LIGHT LOADS The gridmember bears only at outer edges of grooves. The long span between points of contact remains free to flex under load variations.



UNDER NORMAL LOADS As load increases, the distance between supports on grooves is shortened proportionately, but a free span remains to cushion shock loads.

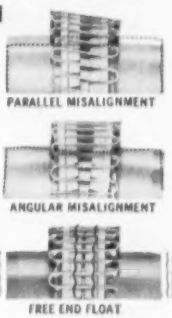


UNDER SHOCK LOADS Under extreme overloads, the gridmember bears fully on the grooves and transmits full load directly. The coupling remains flexible, within its rated capacity.



SHAFT MISALIGNMENT ACCOMMODATED
Free End Float Permitted

Controlled flexibility in the FALK Steelflex coupling provides compensation for parallel and angular shaft misalignment—and permits free end float for the shafts of the driving and driven members, or of either one.



PARALLEL MISALIGNMENT

ANGULAR MISALIGNMENT

FREE END FLOAT

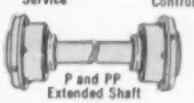
Rapid
CM—Reversing Service

H and HH
High Speeds

FS—Limited Space

BW—Brakewheel Service

FT—Overload Control



P and PP
Extended Shaft

OTHER TYPES AVAILABLE

In addition to the standard Type F (which meets more than 90% of all applications), special or dual purpose Steelflex designs are available for unusual applications. A few of the many types are shown here.

THE FALK CORPORATION, Milwaukee 8, Wisconsin

MANUFACTURERS OF

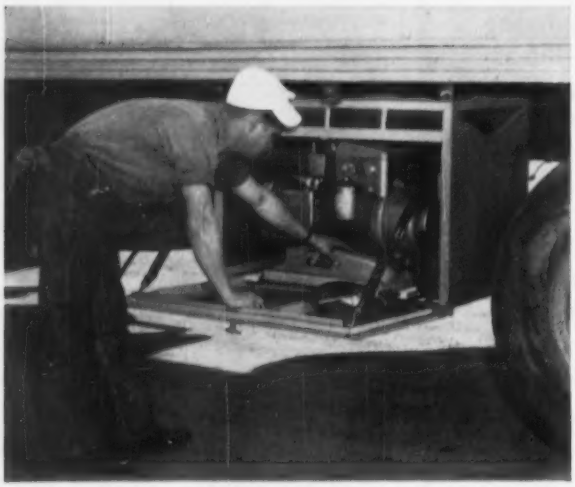
- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

FALK

...a good name in industry

For more information, use coupon on last page.

Refrigerate trucks the really economical way... with the COLDMOBILE "CROSS-COUNTRY"



Exclusive design cuts operating and maintenance costs. The power unit mounts beneath the trailer...has flexible gas and electrical connections that permit the entire unit to be pulled out for easy accessibility.

Keep meat, poultry, dairy products—in fact, all perishables—fresh, whether on the road or at the dock, with the Coldmobile "CROSS-COUNTRY" (Model TR-15). The Coldmobile TR-15 saves money from the very beginning with a moderate initial cost. Its hermetically sealed design eliminates the need for belts, pulleys, jackshafts, clutches or unloading valves. The refrigeration unit mounts on the front wall of the trailer...doesn't waste cargo space.

Dependable Refrigeration When Parking. It's a simple matter for the driver to throw a switch connecting the refrigeration unit with the engine generator and press the starter button for sure, immediate starting. Or the generator can be switched off, permitting the refrigeration unit to operate on "plug-in" power.

Automatic Defrosting and Automatic Temperature Control. With the Coldmobile TR-15 the driver is assured of steady, efficient cooling at all times. There's no need to check the temperature, or take time to defrost the unit.

On-the-job performance proves the Coldmobile TR-15 provides new low-cost protection for interstate or cross-country hauling. For complete information, write—

UNARCO

COLDMOBILE DIVISION
UNION ASBESTOS & RUBBER COMPANY
2900 W. VERMONT STREET, BLUE ISLAND, ILLINOIS

STANDARD-KNAPP GLUER & SEALER

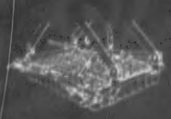
Installation above illustrates the economy obtained in *space* and *labor* by using Standard-Knapp Short Hand Fed Gluers and Sealers. Compact 11½' length — ⅓ shorter than usual. Two units in this installation require one operator and handle different case sizes.

DOES A BIG JOB IN SMALL SPACE

Standard-Knapp's Short Model 429 Case Sealer is designed to get a lot of work done in a minimum of space. This compact unit, which both glues and seals manually fed cases, is only 11½' long. Yet it handles a wide range of case sizes and will glue and seal top or bottom flaps or both at speeds up to seven cases per minute. Higher speeds are possible if desired.

Featuring close-coupled integration of gluer and compression units, the 429 Short is built to the same high standards for which Standard-Knapp equipment is famous. You can count on cases that are tightly, squarely and uniformly sealed — with printed matter unobscured. We will be happy to give you complete details.

Please write Dept. F, Standard-Knapp, Division of Emhart Mfg. Co., Portland, Conn., for descriptive material.



PALLETIZERS

PACKERS

GLUERS AND SEALERS

UNSCRAMBLERS

LABELERS

PLUS other machines for a complete line or single unit.

so smooth...so quick...It's PACKAGING MAGIC

STANDARD-KNAPP

Division of Emhart Mfg. Co.

PORTLAND, CONNECTICUT

LATIN AMERICAN REPRESENTATIVES: American Steel Export Company, New York, N. Y.

Natural Frequency

VIBRATING CONVEYORS

CAN CUT HANDLING COSTS OF

Pulverized, Granular or Lump Materials . . . Castings, Boxes, Packages

Hot or Cold . . . Wet or Dry . . . Corrosive or Abrasive

Natural Frequency Conveyors will move materials horizontally or up inclines of 10° at speeds up to 70 F.P.M. They can also be used to heat, cool, dewater, dry or screen a wide range of materials.

LOW POWER COSTS

Natural Frequency Conveyors utilize the regeneration of power from springs designed to vibrate at the natural frequency best suited for conveying—the new power required is reduced to a minimum. They are built in various widths and in 10 foot sections—one drive will operate several sections.

NO EXPENSIVE FOUNDATION

Due to elimination of vibration from base frame, these conveyors can be mounted or suspended, without special foundations or bracings. Conveyor units can also be used in temporary locations without anchoring.

NO SPILLAGE

There is no violent agitation to cause spillage. The trough is free of obstruction to flow, or pockets to trap perishable materials for spoilage or infestation. All conveyor surfaces can be easily cleaned and sterilized. Furnished with standard open troughs, but enclosed or special troughs for scalping or dedusting can be furnished.

Get complete information on the Natural Frequency Vibrating Conveyor. Ask to have an S-A engineer call, or write for Bulletin No. 353 which contains specifications and general information on dimensions, etc.

SINCE 1901 S-A STEPHENS-ADAMSON MFG. CO.

STEPHENS-ADAMSON MFG. CO.

6 Ridgeway Avenue, Aurora, Illinois • Los Angeles, Calif. • Belleville, Ontario

Engineering Division
Specialists in the design and manufacture of all types of bulk materials conveying systems.

Standard Products Division
A complete line of conveyor accessories including centrifugal loaders—car pullers—bin level controls—etc.

Sealmaster Division
A complete line of industrial ball bearing units available in both standard and special housings.

For more information, use coupon on last page.

PORTLAND, CONNECTICUT
LATIN / MERICAN REPRESENTATIVES: American Steel Export Company, New York, N. Y.

PLUS other machines for a complete line or single unit.

IMITATION
RASPBERRY
by FIRMENICH

gives finer flavor...
greater sales appeal...
to your products

You get the direct and authentic reproduction of raspberries in their full perfection in Raspberry Flavor by Firmenich. For Firmenich took fully ripe raspberries, freshly severed from the stem, captured their delicate and fugitive flavor, and by original research reconstructed it in all its significant and desirable components. Firmenich Raspberry comes to you as a precise and potent flavor material of the utmost purity and stability to enhance the flavor of your products and to make them more attractive to your customers.

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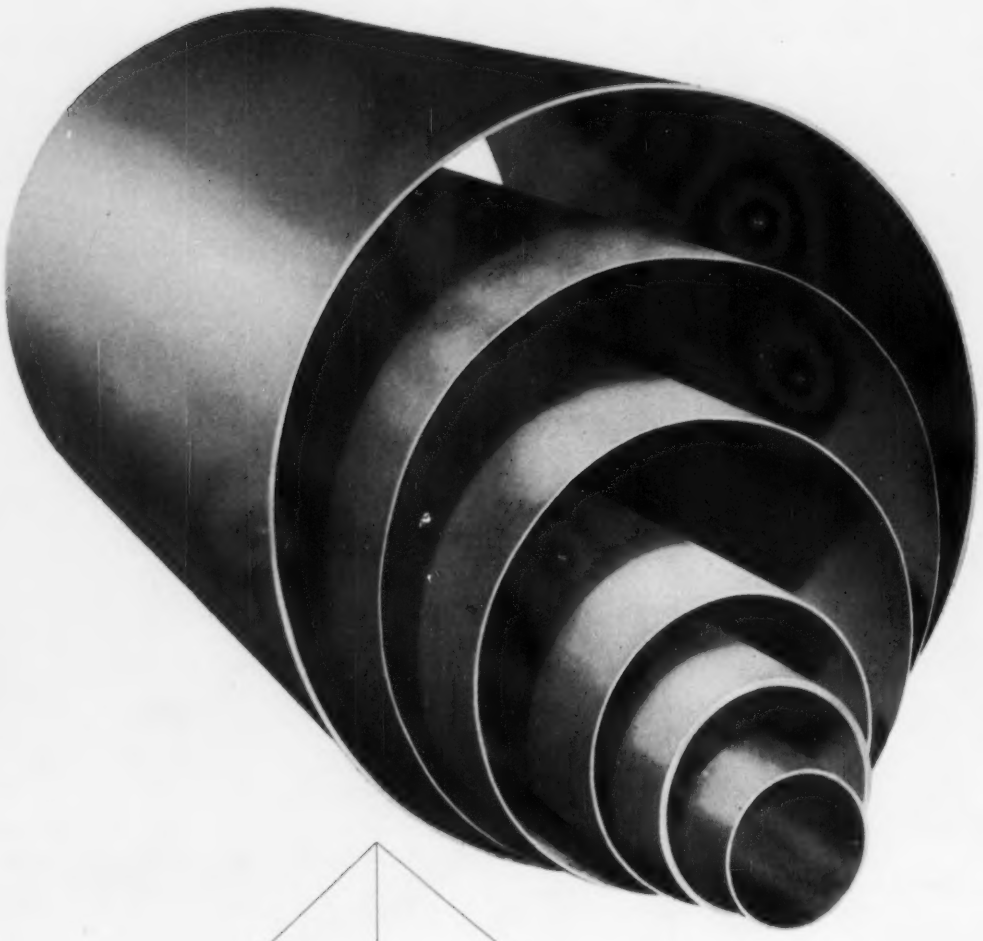
FOOD ENGINEERING



make it TRENTWELD

There is a Trentweld Tubing to fit all your requirements

Aircraft Tubing
Beverage Tubing
Formed Tubing
Heat Resistant Tubing
Large Diameter Tubing
Mechanical Tubing
Ornamental Tubing
Pressure Tubing
Shaped Tubing

for dimensional accuracy . . . physical uniformity

Back of TRENTWELD tubing's reputation for trouble-free service is its manufacture by *tube mill specialists.* But it is not the welding alone — it is the Trentweld process after welding that makes it superior to other tubing.

That's why TRENTWELD means accurate, uniform tubing . . . with excellent corrosion resistance . . . high strength and light weight. And TRENTWELD's smooth surface is easy to clean. It's the right choice where long life and efficient performance are needed.

Important, too, is Trent's wide range of sizes, shapes and grades — the largest in the industry. ⅛″ to 40″ OD are standard, and even larger sizes can be supplied if you need them. So whatever your tubing requirements are, remember, *you can't buy better tubing than* TRENTWELD.

TRENTWELD

STAINLESS STEEL TUBING

TRENT TUBE COMPANY, GENERAL SALES OFFICES, EAST TROY, WISCONSIN (Subsidiary of CRUCIBLE STEEL COMPANY OF AMERICA)

by Western Condensing Co. For its label the new com- to the conventional product. As its raw material, it uses

AWARD PLAQUE will be presented to Western Condensing Co. at IFT meeting in Columbus, Ohio, June 13.

INSTANT MILK is end result of Award-winning Peebles process for improving dry milk properties.

FE Award Goes to Milk Process

Peebles method of making nonfat dry milk instantly soluble symbolizes extensive technical advance in food industry

FRANK K. LAWLER
Editor, "Food Engineering"

Winner of the 1955 biennial Food Engineering Award is the instant milk process developed by Western Condensing Co., Petaluma, Calif. (FE, October '54, p. 74). And the Award plaque will be presented at the annual meeting of the Institute of Food Technologists in Columbus, Ohio, June 13.

This process was voted the most outstanding of many competing for the honor. And it won over others of a revolutionary nature and of great merit. Dr. Samuel C. Prescott, chairman of the Award Committee, reports that the 1955 competition was particularly keen.

So the Award symbolizes the ever-accelerating rate of progress in food processing, as well as the spread of this progress across different branches of the food industry.

The Award competition shows very clearly that our industry has come a long way in the past decade—that food processes have departed from the traditional to become well-engineered, highly technical, efficient operations.

The process honored this year is more than an isolated achievement—it is a sign of the times.

Developed under the direction of D. D. Peebles, President of Western Condensing, the winning instant milk process put dry, nonfat milk into the category of a highly convenient, tasty food. And this high degree of "kitchen convenience" makes powdered milk much more acceptable to housewives.

Following succesful market tests under the name of "Peebles Instant Milk," a new company was formed to distribute the product nationally. Known as Instant Milk Co., the firm is 50% owned by Carnation Co. and 50%

by Western Condensing Co. For its label the new company adopted "Carnation Instant Milk."

Significantly, instant dry milks now are being made by all leading producers of dry nonfat milk solids.

Of porous structure, Carnation instant milk goes into solution in a matter of seconds, and it forms no lumps or balls. Its granular texture makes it free flowing, with pouring characteristics similar to salt. It is nonhygroscopic, and therefore not subject to caking as a result of absorption of moisture from the atmosphere. It does not foam on reconstitution. And it has a fresh-milk flavor.

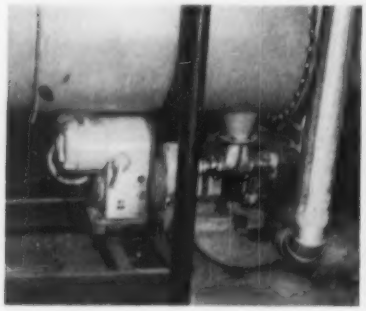
Mr. Peebles points out that reconstituting powdered milk depends upon wetting all of the particles in the mass. In the conventional product, the quick solubility of the fine particles seals over the mass, preventing penetration of moisture into the inner particles and causing the formation of lumps.

The Peebles process imparts different characteristics to the conventional product. As its raw material, it uses low-heat, spray dried, extra-grade nonfat dry milk solids. Batches of the powder, purchased from various sources, are blended in a ribbon mixer (see process diagram). And this mixer delivers the powder through a metering device to an air conveyor which discharges into the processing chamber, the heart of the process.

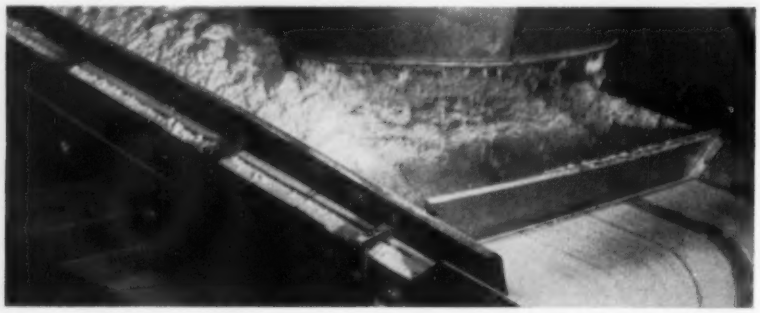
In the processing chamber, the moisture of the powder is adjusted under carefully controlled conditions of time, temperature and moisture to produce a fluffy, sponge-like material. Delivered to a belt conveyor, the product, after a suitable period, discharges into shaker dryers of special design, where the moisture content is reduced to 3-3½%.

In the latter stages of the process, the product takes on granular characteristics. And a sufficient quantity of milk sugar is converted to the monohydrate to make the product nonhygroscopic.

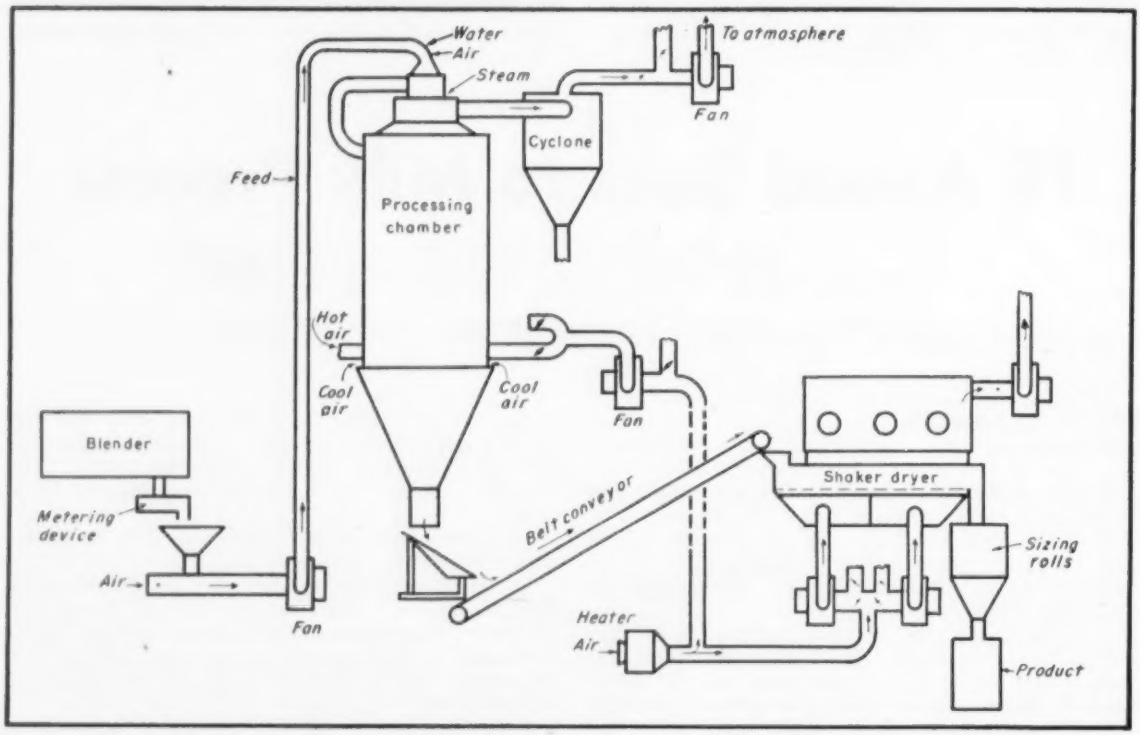
(Turn to page 184)



BLENDER discharges through metering unit to conveyor feeding process.

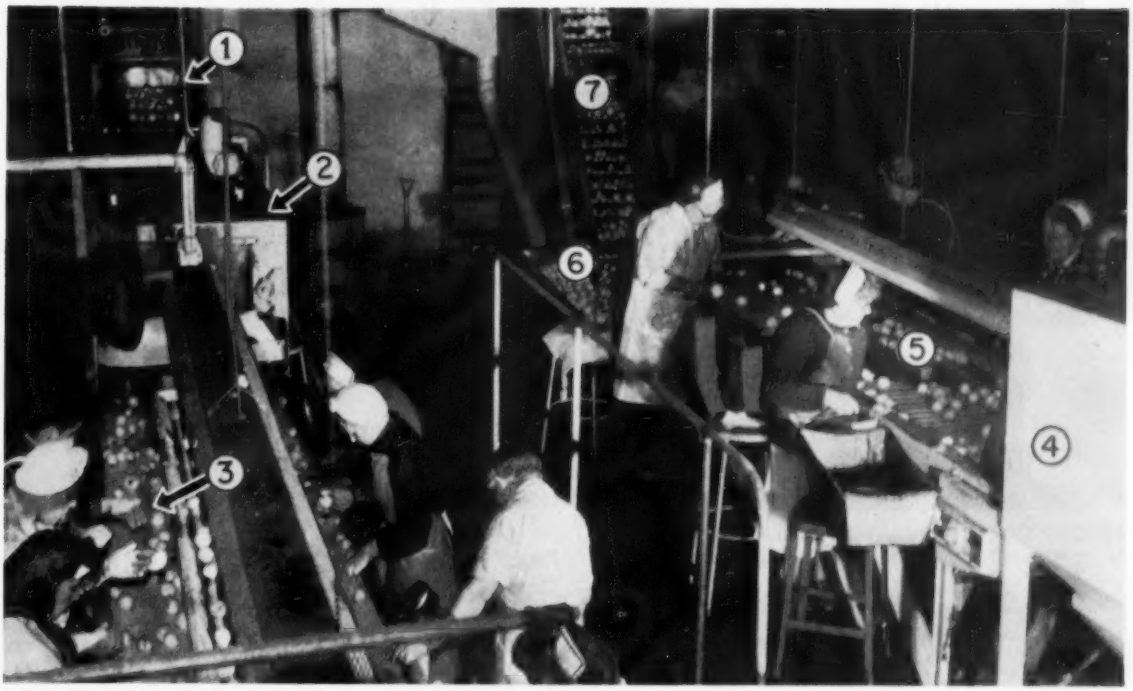


SPONGE-LIKE material discharges from process chamber onto belt conveyor that takes it to shaker dryer.



IN PEEBLES PROCESS batches of conventional nonfat dry milk solids are blended and metered to process chamber. There it is converted to fluffy, sponge-like material under carefully controlled conditions of time, temperature, and moisture. Product is then conveyed to shaker dryer where moisture is reduced to 3-3½%.

Continuous Weighing, Slicing, Dehydrator Feeding



RAW PRODUCT moves continuously through flame peeler (1); washer (2); to trimming belt, (3); then goes to second washer (4); final trimming table (5); surge hopper (6); elevator (7) that moves it to belt-scale (not shown).

Continuous Unit Operations Break Batch Bottlenecks

Photo-cell fed flame peeler, automatically controlled flow, continuous belt-type dehydrator, replace batch, tray-tunnel method in production of dried onions and garlic. Setup increases output, cuts labor, ups quality

C. R. HAVIGHORST
Senior Associate Editor, "Food Engineering"

Processing bottlenecks are costly. And many food processes have one or more unit operations which tend to restrict high-volume, continuous flow.

In food dehydration, the major limiting factor has been the drying operation. This bottleneck was eliminated at the Gentry Div., Consolidated Foods Corp. Gilroy, Calif. plant when, late in 1954, a continuous convevor-type dehydrator for onions and garlic—first in the field—was installed. Outstanding features of this unit are:

1. Continuous instead of batch-type flow.
2. Elimination of foreign matter.
3. Increased capacity—75,000 lb. per 24 hr. of onions containing 86% moisture.
4. A more uniform, higher quality product.
5. Highly effective quality control.
6. Savings in labor—much less needed than in tunnel operation.

Design Responsibility

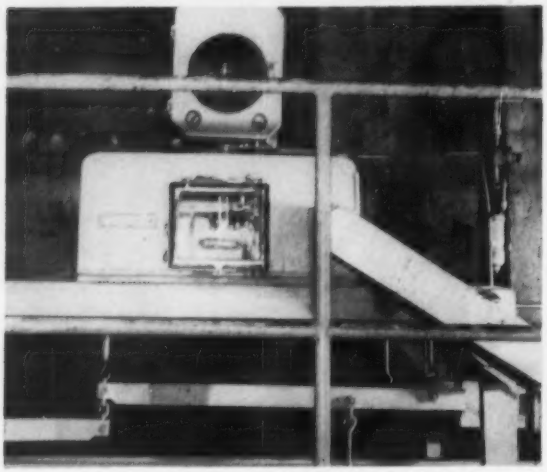
In the food industry there are relatively few dehydration plants. And, since these do not comprise a large market for machines and equipment, management has taken a realistic view of research and development and placed the responsibility of engineering largely on its own staffs.

In this new line, all unit operations (except conveyors, elevators, etc.), not named as being manufactured by commercial machinery fabricators, were designed by the Gentry staff and fabricated by, or for them.

One of the major fundamentals of good food plant engineering is a broad knowledge of the processes and equipment. Here are several units individually engineered for specific operations. Of primary interest is the new Proctor & Schwartz dehydrator. But, this is still dependent on other unit operations. So, let's start at the beginning of the line and get an over-all picture of it.

Gentry provides White Globe variety onion seed for contracted acreage,

Continuous Weighing, Slicing, Dehydrator Feeding



AUTOMATICALLY controlled scale mounted on conveyor delivers uniform, recorded flow of onions to slicers.

OSCILLATING conveyor (arrow) deposits uniform bed of product slices on top belt of dehydrator.

all of which is under control of its field men. Mature bulbs are harvested, bagged, and allowed to cure. Following curing, small onions and debris are mechanically separated from the mature bulbs which are re-bagged or loaded in bulk trucks for delivery to the plant.

Upon arrival, they are mechanically cleaned, graded to size and placed in storage pending dehydration. Storage is critical and poses many problems over the long operating season. To insure sufficient reserve, inventories often reach 10-15 million lb.

From storage, onions are transported in bins by lift trucks. These are equipped with a dumping-mechanism that permits the operator to completely up-end the bin, and unload the material in a 3,000 lb. feed hopper.

Photo-cell Feeds Flame Peeler

A photo-electric cell regulates the feed from this hopper to an elevator leading to the flame peeler. Elevator motor is equipped with a variable speed control regulated by the electric eye.

The specially designed peeler is actually a rectangular-shaped, refractory shell furnace. It is fired by 49, high velocity natural gas burner-nozzles. Under high pressure, these develop a temperature in excess of 2,000 deg. F.

Conveyor, which moves onions through peeler, consists of a series of alloy steel finned rolls, the shafts of which are fixed to an endless chain. Gears at the ends of each shaft are turned by a gear-track. Thus, the onions are revolved and entirely exposed to the intense heat for a matter of seconds to burn off the dry outer scales, roots and stems. Charred particles are drawn off by high velocity air to a cyclone separator.

From the peeler, onions enter a washer. This unit consists of a series of longitudinal, "U" shaped, cylindrical brushes and a high-pressure oscillating water spray system. Combined brushing and washing removes charred skin and dirt and, also, cools the onions. They are discharged on a "merry-go-round" type trimming conveyor where operators de-root and stem them with Hydrouts. A variety of knives may be used with these hydraulically powered units for coring and trimming.

A second washer, identical to the first, removes undesirable trimming fragments, then the onions exit to a final trimming and inspection table.

This table consists of a series of alloy rolls, rotated by two endless chains, that enable inspection of the entire vegetable as it is conveyed to the surge hopper. Any remaining portions of stem or root are removed here. And, onions deemed defective or undesirable are discarded.

Scale Controls Flow

From the hopper a constant flow of raw material is elevated to a conveyor where a Fairbanks-Morse continuous scale registers total weight of product moving to the slicer. Predetermined flow rates from the surge hopper are uniformly controlled by a Taylor Instrument Cos. automatic control for continuous scales.

Flow maintained by this control system has a motion transmitter on the scale beam which, when set weight varies, transmits a signal to the recording receiver controller. This instrument actuates an air operated lever motor to position the elevator's Reeves drives, and thus control its speed.

The slicer, a rotary cutter, was designed to produce optimum onion slices for dehydration purposes. From here the material flows to a vibrating conveyor and then to an oscillating belt conveyor which moves in an arc, depositing a uniform bed of material on the perforated, stainless steel top belt of the continuous dehydrator.

This unit is 247 ft. in length and 14 ft. wide. It comprises three separate drying stages, each one independently operated and controlled. Each stage has multiple compartments with individual air heating systems. Hot air is moved at high velocity by 10 hp. (50,000 cfm.) blower type fans, located atop the unit. Air distribution rate, quantity and exhausting rate is controlled by a system of dampers. Ductwork is designed to deliver air upwards through the bed of material in alternate compartments and down through the bed in the others.

Automatic-Temperature Control

Flow of natural gas to burners that heat drying air is regulated by 7 Minneapolis-Honeywell recording controllers. They are of the mercury filled, bulb type, with proportional band and reset, and they modulate gas flow in relation to temperatures required.

Each compartment is equipped with a set of gas burners, mounted at inlet ports. Incoming air is heated by direct contact with burner flames. The entire unit is enclosed. Each stage is equipped with separate conveyor belts powered by individual 3 hp. Varispeed motors. The conveyor in the first stage moves most rapidly, with

that in the second and third stages reduced by 25% respectively. However, speed is varied in relation to moisture content of the material being dried.

Automatic Transfer

Continuous, automatic transfer, from one conveyor to another, takes place within the unit. Dehydration efficiency is improved by initial loading and transfer methods, which provide a uniform, fluffed layer of product easily permeated by the air flow.

A doffer, located at the head shaft of the first stage, removes the material from this conveyor at a continuous, uniform rate, transferring it to a breaker. This fluffs the material before depositing it on the second stage conveyor. This handling is repeated at the transfer to stage three.

In the initial stages, temperatures as high as 180 deg. F. are employed. These are gradually reduced to 130 deg. as the product becomes dehydrated to less than 15% moisture at the discharge end.

The unit is exceedingly versatile. It is designed and engineered with controls for all essential operating characteristics. Dry and wet bulb temperatures, speeds of conveyor belts, and depth of loading all may be varied by adjusting automatic controls. These varied conditions compensate for critical changes in ambient atmospheric conditions and those of the raw material being dehydrated. In the latter case, variations are largely due to varietal differences.

In addition to economies in labor, this unit brings significant advances in product quality improvement. It requires only 3 hr. to convert raw material to dehydrated product, ready for binning, at a moisture level under 15%.

With the tray-tunnel method, onions are sliced, spread on trays, and the trays stacked on cars which are moved into dehydration tunnels.

The new continuous system obviates delays. Onions start through the process in a continuous stream, and are in the active dehydration phase within a few seconds following slicing.

Labor costs in traying, detraying and some tunnel costs are eliminated by this continuous operation.

There being no delay in the flow of raw material, quality control is far more efficient. Frequent tests are made of the product taken from selected unit operations. The continuous dehydrator operates in a condition of equilibrium which deviates, or drifts only slightly within reasonable periods of time. Continuous control procedures readily and simply indicate desirable corrective measures to prevent these deviations. These result in maintenance of uniform conditions throughout the entire process.

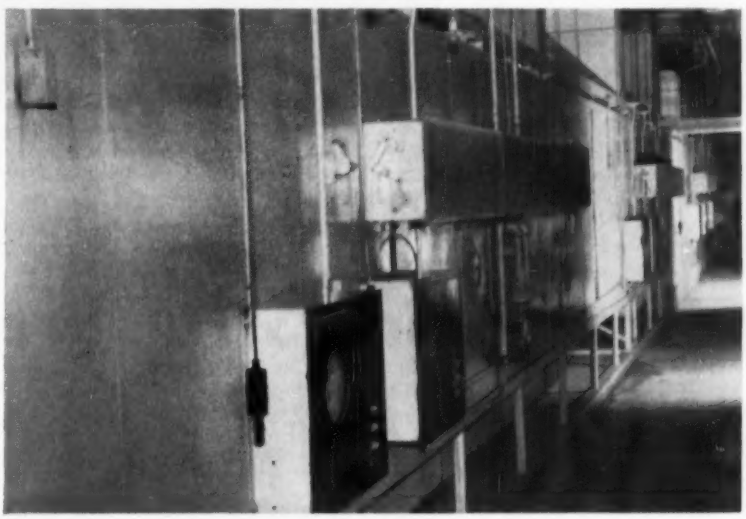
Final Drying

Dehydrated product is discharged from this unit onto a conveyor thence to a bucket elevator which spreads it on an inspection belt. This belt discharges into portable, metal bins, and these are moved by lift-truck into the final drying room.

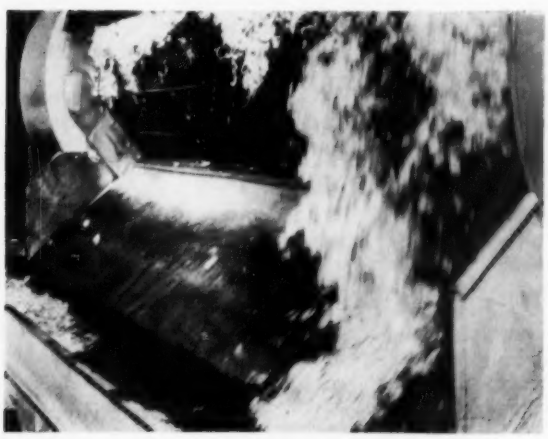
In this finish-drying operation moisture content of product is reduced to less than 4%. A room temperature of 120 F., and humidity of 20 grains moisture per lb. of air is maintained. Humidity is controlled with a Bryant,

(Turn to page 212)

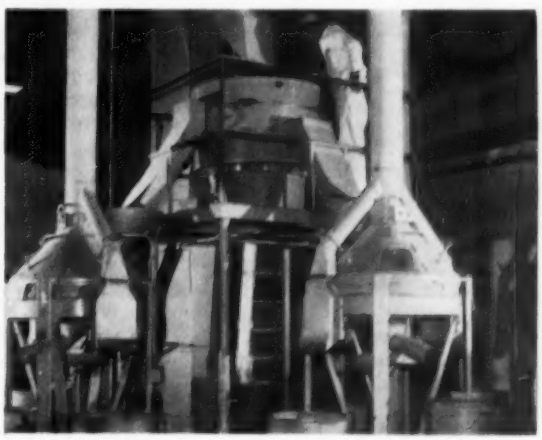
Drying, Classifying, Packaging



HEART of continuous system is this 247 ft. long, three-stage belt-type dryer. Control of air temperature is automatic, as is also transfer of product from one stage to another. Product is fluffed during transfer.



DRIED to 15% moisture, slices are discharged from dehydrator. Conveyor moves them to final inspection.

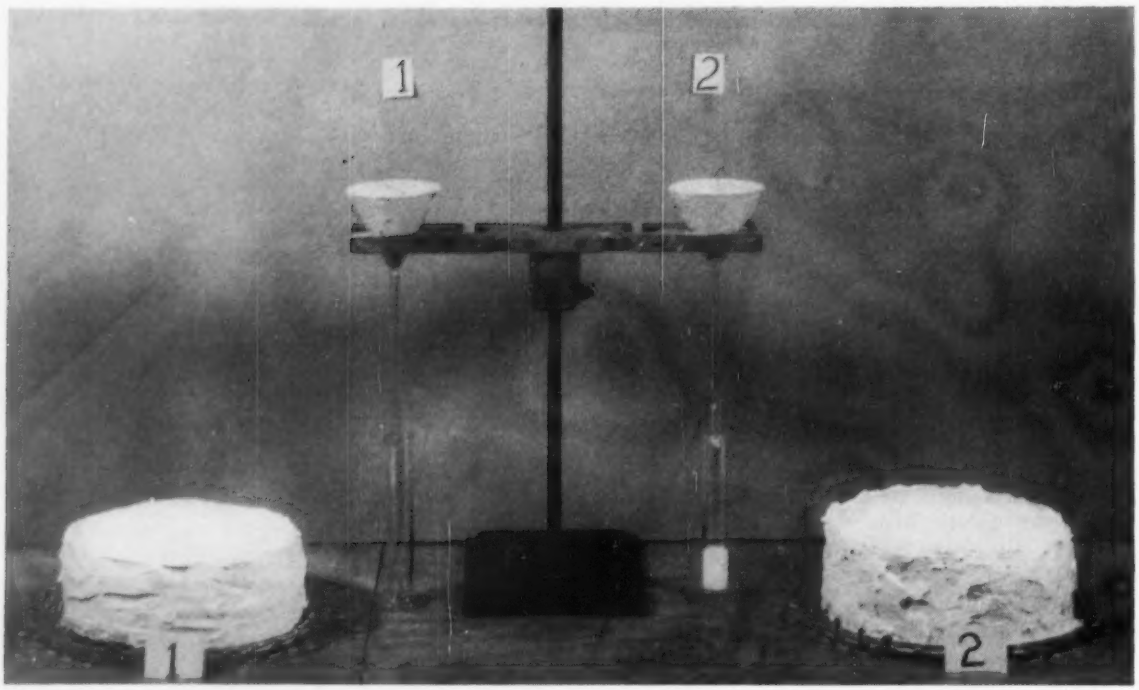


FINAL DRYING to 4% moisture is followed by sieving, air-classifying, packaging in drums for shipment.

An aerated, larger-volume icing with the protein partially aerated and the

Also, there is a high level of soluble materials in totally dissolved form and

icing stabilization has been develop-



EXAMPLE of what good engineering can achieve in formulation of an icing. Stabilized soy-protein icing on Cake 1 shows no breakdown when frozen for 10 days at —25 deg. F. Nor does same icing in Funnel 1 reveal evidence of drainage in graduate. In contrast, Cake 2, with egg-albumen icing, breaks down under the same conditions. Moreover, considerable liquid drains or "weeps" from same icing in Funnel 2.

Engineering *Structure* Into Foods

In crystallized sugar we have the "building blocks" of a basic icing formula. These blocks are "mortared" by foaming agents, and strength is added by heating or freezing. Thus food technologists are constructing various modified food products of greater volume

MELVIN MICKEVIC
Technical Representative, Seaplant Chemical Corp., New Bedford, Mass.

Let's compare construction engineering with food technology . . .

When a construction engineer designs a bridge to support a specific load, he first roughs out a sketch of the proposed span. Next he refers to various handbooks on standard construction materials and works out his design, from heaviest supporting beam to superstructure.

Thus, knowing the desired performance of the bridge and the limits of the materials to work with, he comes up with the finished span.

But when a food technologist must develop a new product, the task is far more complex. Unlike the construction engineer, he has few handbooks that will help him predict the interaction of several food ingredients.

Hence, more imagination and ingenuity are required to develop a new product. . .

Even so, raw materials play significant roles in the *construction* of food products.

Start of the Building

As an example, consider the *engineering* of different icing formulas—starting with a flat icing, which comprises crystalline building blocks made up of water and sugar. Then, adding to these blocks a "mortar" in the form of whipable proteins or their derivatives, the "building" will start going up (volume of the icing increases).

Heat applied in the form of sun's rays to the mason's mortar strengthens his structure. Similarly, application of heat to the coagulable protein in the icing formula also adds strength to the product and results in a meringue.

Now we'll begin with the flat icing, which consists essentially of water and sugar, with possibly a stabilizer to control sugar-crystal growth. This icing contains no proteins, nor is it aerated. It does, however, have a high level of soluble solids—very little dissolved, but their crystalline structure rearranged.

Suppose we now introduce whipable protein to the flat icing. Result:

An aerated, larger-volume icing with the protein partially aerated and the free water contained. In this mixture there are soluble materials in solution. There are also undissolved substances and low solubility materials (of a competitive nature) mostly not in solution.

Purpose, from a construction standpoint, of adding whipable protein is to incorporate air into the icing and, thereby, provide a means of extending the building blocks (crystallized sugar and water) into a bigger structure.

With more water, and perhaps more protein, added, and also heat applied to coagulate the protein, the icing is modified into a meringue. Heating, as stated, strengthens the formula structure in the same way as does drying of mortar between laid building blocks.

In this case, more protein is introduced to get more air (with whipping) into the product. The resulting meringue is now fully aerated—actually an air dispersion of heat-coagulated protein and water.

Here, then, is engineering construction of food products—from a flat-icing structure to one partially aerated, and finally to a fully aerated meringue.

Another Construction

For additional engineering developments in the formation of icings, we now add non-emulsified fat to the building blocks, sugar and water, in the flat-icing formula. Result: A cream icing, with fat-coated sugar crystals in a water suspension.

Then to increase the size of our structure (volume of icing) we add more fat and water to the cream icing and then whip it. And here we have a theoretical whipped cream when the system is balanced. This fully aerated product is an air-in-fat form of water suspension, with the protein (from the milk that is added with butterfat) forming a protective film around the entrapped air.

The whipped cream has a high level of fat and a low amount of soluble materials in dissolved form. Also, there is a high level of low-soluble materials in suspension. And because of the amount of fat present, this whipped cream structure breaks down with a temperature rise. Hence, to be stable, it must be kept cool.

To this whipped cream base, let's add more soluble materials and then freeze. This makes ice-cream—a more stable and solid product than whipped cream.

In this case, the fat's surface tension is reduced at a low temperature in a water suspension, with the protein forming a protective colloid film. Also, there is a high level of soluble materials in totally dissolved form and a similar level of low soluble ingredients. As with whipped cream, this ice cream quickly breaks down with a rise in temperature.

In the above development, we have an indication of an engineering trend —two basic icing structures being developed into more complex physical systems.

Role of Stabilizers

Now let's study the icing structures in more detail.

Flat icings, as used by the baker on coffee rolls, cookies, cakes, etc., constitute the greatest volume produced today. Such icings usually consist of 85% sugar 6X, 15% water, plus 0.1 % stabilizer.

If freshly pulverized sugar is used and it is ground fine enough, a stabilizer can be omitted. Once the pulverized sugar is allowed to stand awhile, it begins to clump. Consequently, there is less surface area to wet. And hence there is need for a protective colloid or stabilizer.

In recent years, a heavy volume of icing bases for use with flat icing has been evident. Such bases are simply convenient means for introducing a stabilizer (either agar or carrageenin) into a bakery mixer. Sold as plastic bases, they eliminate the chance for error in small-scale weighing by the baker.

Most icing bases consist of 80% or more of sugar with 12% or more of added water. The level of stabilizer introduced by the baker using the icing base is about the same as that incorporated by the baker using an undiluted stabilizer.

When a flat icing (85% sugar and 15% water) is prepared on the heated stage of a microscope and observed under low-power magnification, its performance in cooling or setting is quite evident. First, small nuclei form as centers of crystal growth. Next, more and more crystals appear, until the icing solidifies.

However, when a stabilizer is added, rate of crystallization is faster and more uniform. The ability of gum to gel is related to the final gloss of a flat icing. That is, agar, which gels at about 90 deg. F., gives an excellent gloss.

On the other hand, a non-gelling type of carrageenin, used pound for pound as agar, gives the same stability relative to heat breakdown and cracking. Because it does not gel, it gives a poorer surface reflectance or gloss. When agar is not used, other techniques must be employed to assure a gloss—using a tapioca dextrin.

In the past few years, a new type of icing stabilization has been developing: Use of a protein (such as gelatin, milk solids, or soy albumen) in conjunction with carrageenin brings about a coprecipitate, which provides good stability, at very low cost, to a flat icing.

And now for a look at aerated icings—involving a more complex engineering structure, yet a basic one from which a number of other products can be developed.

Proteins or their derivatives are the most popular frothing agents in the food industry. Gelatin, milk (casein or whey), soy and egg proteins are the basic working tools in aerated products. For a protein to whip, it must exhibit a colloidal nature—surface tension of the protein in solution must be small, otherwise its tendency to reduce the surface area would be too great.

In a foam, surface on the liquid has been greatly extended. This is in conflict with the tendency of surface tension to reduce the surface to a minimum.

In many ways, foams or air in liquid are similar to emulsions or fat-water suspensions. Function of the whipping agents is to produce a surface layer differing in composition from that of the bulk of the liquid—*i.* e., by negative or positive adsorption at the interface between layer and gas.

In considering aerated icings, one must recognize those made with fats that have been hydrogenated and mixed with an emulsifier. Without added emulsifier, such fats would not whip, for the surface tension would be too high to allow extension of the surface to incorporate air bubbles.

Optimum whipping pH is a feature with every protein. In food formulation, it may not always be possible to work at optimum pH, so sacrifice in stability and volume must often be made because of some consideration of color or taste.

We find pH an important requirement in foams, since solubility of proteins varies with increase or decrease in alkalinity or acidity. Proteins, being amphoteric, will react with acids and bases—these reactions often interfering with whipping conditions.

Stable Foams

Essential for a stable food foam is low vapor pressure. When a bubble rising in a liquid comes near the surface, it lifts a liquid dome. And if the vapor pressure within the bubble is great enough (as in the case of warm soda water), this dome bursts, to produce a fine spray. If the vapor pressure is low (as in the case of very cold soda water,) the bubble is retained within the liquid.

Also, a stable foam requires a low surface tension. Consider the case of egg whites in a beater: With slight whipping, entrapped air bubbles are large and the whites appear foamy, yet transparent and "runny." However, with longer whipping, the whites become less transparent, whiter, and more solid.

Thus, because of low surface tension inherent in egg protein in solution, more and more air may be incorporated and held in place by the colloidal protein that forms a film around each air cell.

Also, a stable foam requires a tendency for the surface of the extended protein film to solidify, thereby giving structure and permanence to the foam. Egg albumen is a hydrophyllic (water-loving) colloid, for it is readily soluble in water. However, when subjected to heat, egg albumen becomes insoluble in water or is said to be hydrophobic (water-hating).

Through this phenomenon of changing solubility, egg whites make very stable foams when used at sufficient concentration.

Action of Solids

Foam stability is also affected by solids. Lactose will greatly aid in the stability and plasticity (desirable in freezing) of soy protein-icing foams. Such a system is said to be a three-phase foam—a liquid (protein in solution), gas (air), and solid (sugar, salts, starch, and flour).

Use of starches in meringues similarly points to a three-phase system. A solid particle will tend to prevent coalescence or merging of two bubbles in a foam, if it is in simultaneous contact with both bubbles.

The thinner the protein film in foam, the smaller probably will be the effect of solid particles on its stability. Egg-albumen films are thinner than soy-albumen films. Hence, one finds greater stability with solids in soy than with egg foams.

Some degree of wetability is also desirable with solid particles in a foam. If too wetable, the solid will be sucked into the bubble and, conversely, if insufficiently wetable, there will be too much extension between bubbles, lessening structure stability.

Three-phase foams are of greatest interest to the food field. Why is it that the same batch of meringue or icing powder whipped on two different-design beaters gives different volume and stability?

It is common practice in the candy field to use two different types of soy

(*Turn to page 183*)

FRESH PIMENTOS (A) are greatly reduced in volume and weight by dehydro-freezing. Prepared meats (B) are dehydrated to 33% of fresh weight (C), then chopped to desired size (D), packed in tin containers, and frozen.

Dehydro-Freezing Pays Off on Pimentos

Dual process produces high-quality product and saves in shipping, container, and storage costs

RECENTLY applied to peas and apple slices on a limited commercial scale, dehydro-freezing already has proved its merits in preserving pimentos.

Its most important advantage is high product quality. But significant economic advantages have been demonstrated, too, by California Vegetable Concentrates, Inc., Huntington Park, Calif.

Dehydro-frozen pimentos reconstitute rapidly and easily. Upon thawing there is no excess "bleeding", and the reconstituted product has a deep, rich, red color, similar to that of the fresh sweet pepper.

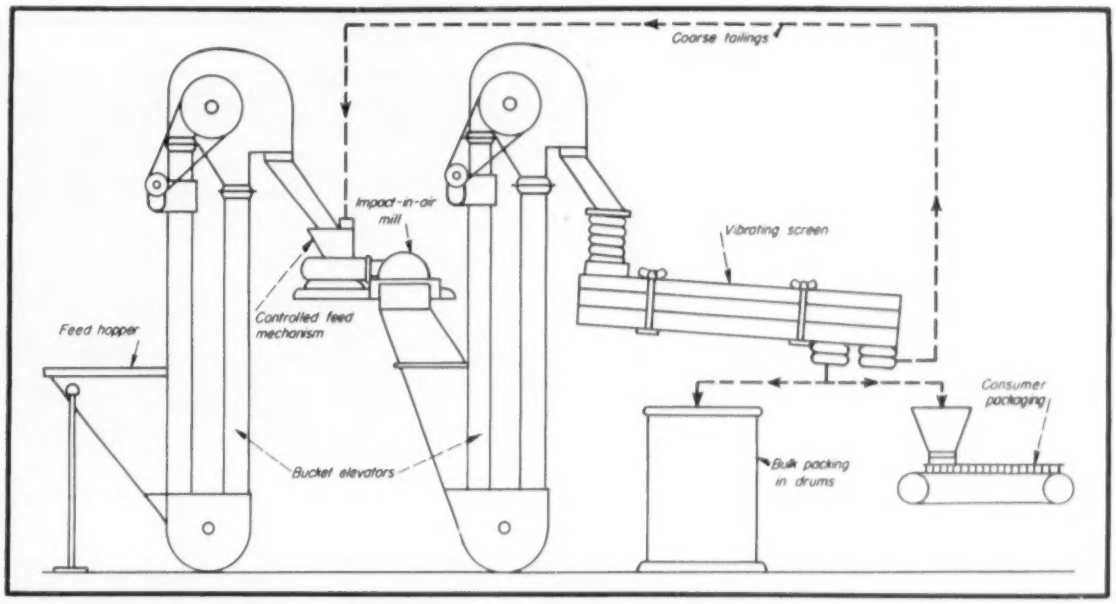
Since the product has not been precooked or pre-treated, other than by partial dehydration, it retains essentially the same texture as the fresh meat when reconstituted.

Economical advantages show a savings of about two-thirds in the cost of containers, shipment, and storage because of the reduction in product weight and volume. And 28 lb. of dehydro-frozen pimentos, packed in 30-lb. tin containers, represents, on a solids basis, 84 lb. of the original fresh, fruit meat.

Up to the point where dehydrated pimentos are chopped, then frozen, the process differs only slightly from that of usual drying procedures. The pimentos are quality sorted on an inspection belt, then conveyed to a flame-peeler which removes the skins.

After being washed (with high-pressure water-sprays), the peppers are hand trimmed, cored, and again washed to remove any remaining seeds or skin fragments. These meats are then trayed and dehydrated to about one-third their original weight.

Weight reduction is carefully controlled and is actually dependent upon the amount of total solids present in the meats. Controls are based upon producing a finished product of about 22% solids content. The dehydrated product then is chopped to size, packed in 30-lb. tin containers, and frozen in a tunnel freezer in an air blast of 20 deg. F.



COMPACT, highly efficient new method of grinding pepper at Foran spice plant is shown step-by-step in this diagram. Whole black pepper is charged into supply hopper and bucket-elevated to control mechanism feeding impact-in-air mill. Ground spice is then elevated to vibrating screen. Note how the coarse tailings are returned to feed mechanism.

IMPACT-IN-AIR GRINDING

Wins Significant Benefits

Fully automatic, flexible system is now grinding whole black pepper into premium quality product . . . And it has improved operating efficiency

GEORGE M. KOVAC
President, Cog Engineering Products Co., Chicago

For a number of pertinent reasons, the last of the spices—black pepper—is now being continuously ground by the impact-in-air size-reduction technique at the Milwaukee plant of Foran Spice Co.

Here are six solid reasons:

- **New quality uniformity is assured.**
- **Output is doubled—3,000 lb of ground pepper being produced per 8-hr. day, as compared with but 1,200 lb. on the former 4-roll mill.**
- **Product shrinkage is halved.**
- **Horsepower needs are snipped to one-third.**
- **Cutting-floor space requirements are cut to one-quarter.**
- **And maintenance is now "way down."**

As for power factors, the new impact mill, made by Cog Engineering Products Co., has a 7½-hp. drive motor, ½-hp. feeder, ½-hp. discharge elevator, and ¾-hp. shaker motor. Total horsepower on roller mill is 27½.

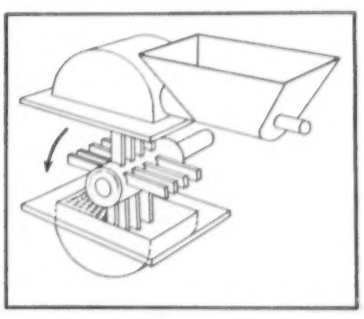
Whole black pepper remained the final spice to be ground by hammer-mill chiefly because of the exacting standards of appearance and particle size established by food manufacturers. Pepper is the most widely used of all spices, and processors had felt it necessary to adhere to the conventional roll-mill cracking practice. The first attempts to grind whole black pepper in hammer-mills were unsuccessful. Reason was that the pepper was ground to size without screening—thus resulting in too wide a range between maximum and minimum size particles.

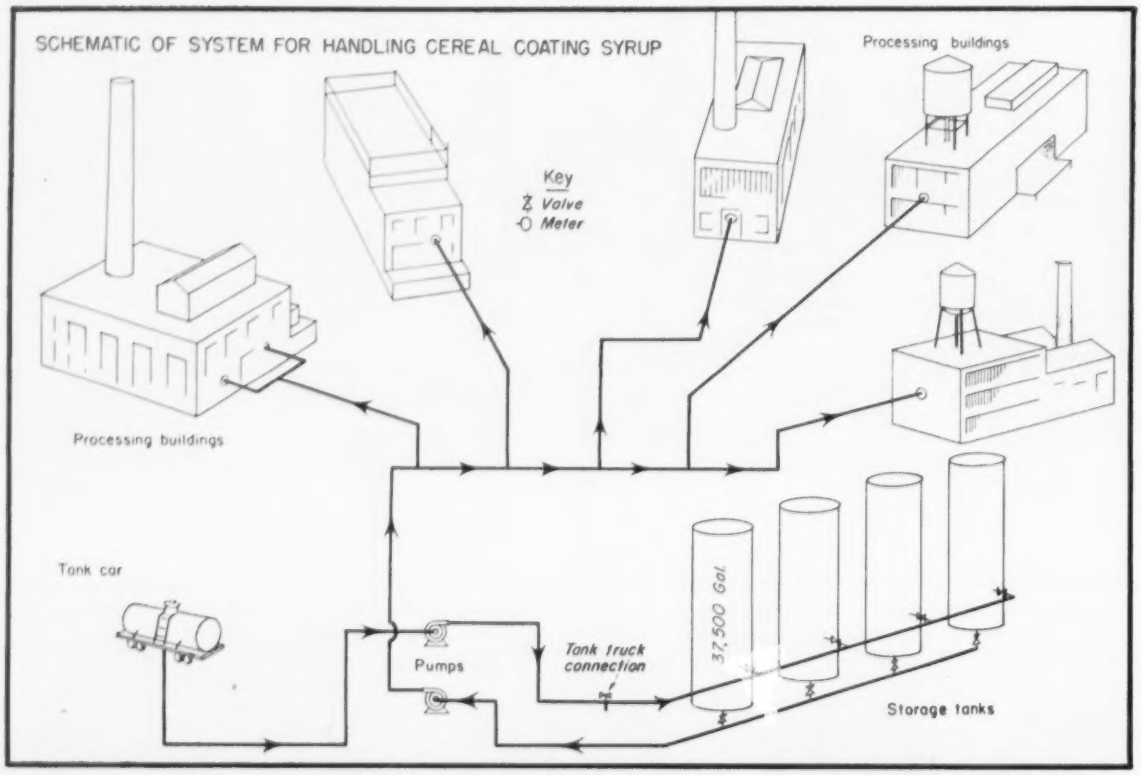
Behind Foran's whole-pepper-grinding achievement has been astute foresight in insuring non-varying produc-

(Turn to page 159)

How Mill Works

—is revealed by this "inside" sketch of 16-hammer unit. Hammers are spaced on rotor so as to describe labyrinthine path through product being ground. Material is fed at controlled rate, and practically on a tangent, into hammer path. It is picked up by action of mill, impacted in air, and passed out through a sizing screen. If not properly reduced, it bounces back into hammer path for another impact.





HIGHLY EFFICIENT facilities for moving cereal-coating syrup at Post Cereals are depicted above. They bring large monetary savings, with the syrup now being directly metered into coating process.

How Post Cereals Built Syrup-Coating Efficiency:

ADVANCED HANDLING DID IT

Tailormade or company-made cereal coating syrup is tank-stored, then pump-metered up to 1,000 ft. to 7 distributing points in 5 buildings

W. F. MASSMANN and R. W. RIVERS
Respectively, Director of Research and Project Engineer, Post Cereals Div., General Foods Corp., Battle Creek, Mich.

A few years ago, Post Cereals Div., General Foods Corp., decided that its facilities for making and handling cereal coating syrup were inefficient.

Bagged sugar was dumped into seven stainless steel, steam-jacketed kettles to be melted, along with other ingredients, into a syrup for spraying on cereals to make our popular pre-sweetened Sugar Crisp and Sugar Krinkles.

The melting kettles were spread out in five buildings. And manual sugar handling bottlenecked operations.

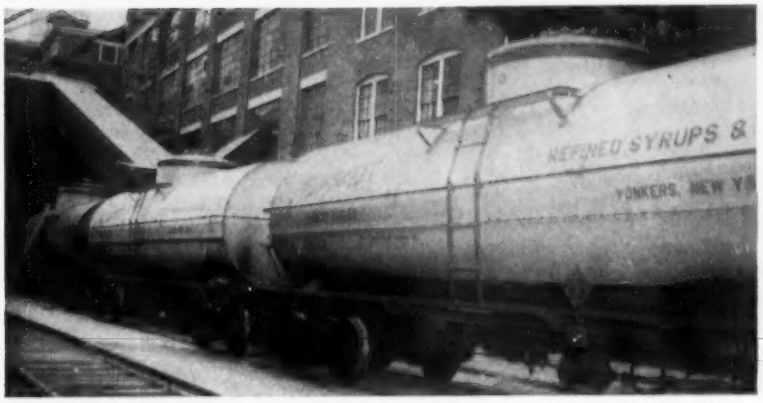
Our company wanted to set up a speedier, less costly, more efficient system.

Accordingly, we weighed the pros and cons of various methods, and finally settled on our present handling system. True, the points into which coating syrup is delivered are still in the same five buildings. But with our new efficient technique, the syrup is pump-metered from a central point—a battery of four outside storage tanks, each holding 37,500 gal. These tanks now receive the cereal coating syrup from tank cars or tank trucks sent out from centers of Refined Syrups & Sugars, Inc.

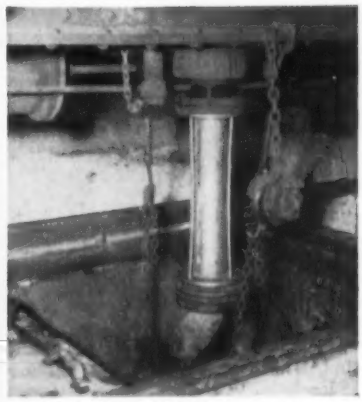
Advantages of the new system are impressive:

- **Sanitation is improved since the system is closed.**
- **Processing equipment is now arranged more neatly and efficiently.**
- **Considerable floor space is saved, because bags of sugar are no longer stored in the plant. What's more, the syrup storage tanks, as noted, are outside of processing buildings.**
- **Manual handling of bags of sugar is abolished. Workers merely need open valves to meter the syrup into process. Valve closes automatically**

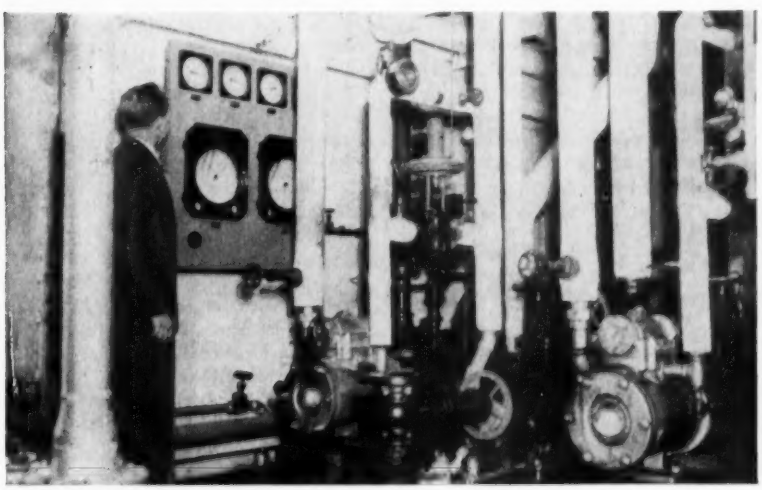
Glimpses of Advanced Syrup System



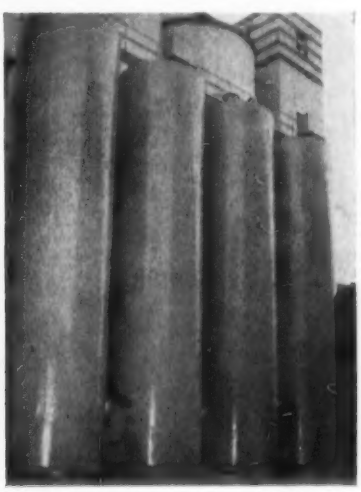
TANK-CAR SHIPMENTS—10,000 gal. of syrup—come into Post siding from Detroit distributing point of Refined Syrups & Sugars.



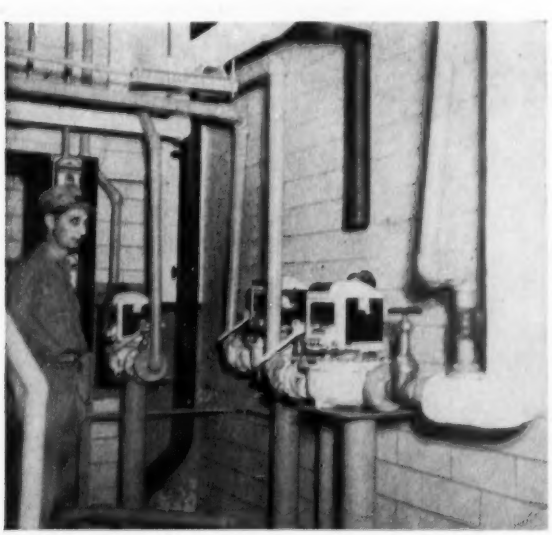
PIPE is pneumatically raised from pit and connected to tank car.



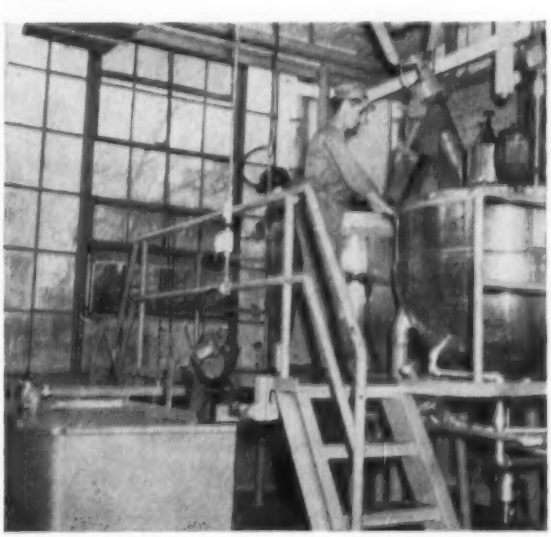
STEAM-OPERATED pumps unload tank cars, feed storage tanks, and distribute syrup to metering stations in five processing buildings.



THESE are the specially designed storage tanks (37,500 gal. each).



IN PROCESS buildings, the syrup is metered into tanks, along with honey and corn syrup.



CEREAL COATING syrup is gravity-fed from blending kettles (right) to surge tank (left), ready for cereals.

when correct amount has been delivered.

- ▶ Physical hazards incident to former handling of bagged sugar have been eliminated.
- ▶ Syrup is now more accurately measured into process.
- ▶ Product quality is more uniform.
- ▶ Amount of syrup is automatically recorded.

It is to be specially noted how mechanization is primary in this progress.

Closeup of Technique

Specifically, the facilities operate in this manner:

Each tank car of coating syrup is spotted directly over a pit, where a pneumatically-operated flanged pipe (4-in. dia.) is connected to the discharge pipe of the car. Syrup is emptied from tank car into storage tanks at a rate of 75-100 gal. per min. by a steam pump (125 lb. steam). Distance from car to pump is 30 ft., and from pump to storage tanks, 115 ft.

Similar pump feeds coating syrup from storage tanks, through magnesia-insulated pipes (3 and 4 in.), to the seven metering stations.

Both pumps are hooked up for either unloading tank cars or storage tanks. In reception of syrup from tank trucks, pumps on the trucks feed syrup into storage.

Specially-lined and mounted vertically, Post's storage tanks feature dished bottoms. And they are provided with germicidal lamps, as well as exhaust fans and filters to avoid moisture condensation on surface of syrup. Tanks are set up on a reinforced concrete base with imbedded 1-in. radiant heating coils at 8-in. centers. Fill, drain, delivery, steam, and condensation piping is carried over the slab in a header (length of foundation).

More Pumping Details

Temperature of syrup in tanks is regulated by a recorder-controller mounted on a panel in the pumphouse. Sensitive temperature element is near the bottom of each tank. Too, each tank is equipped with a remote-reading tank-level gage panel-mounted in the pump room. Cereal coating syrup is pumped a maximum distance of 1,000 ft. to a metering station. Of that distance, some 100 ft. is vertical.

A controller constantly maintains 80-psi. pressure on the steam-pump. Steam-pressure operating the pumps is also automatically recorded on the pumphouse instrument panel board. Tank-to-tank hookup to the pump feeding to process is carried out manually. Steam piston pump-pulsation is reduced by means of an accumulator at discharge end.

Flexibility, Too

In addition, facilities have been provided for continuous processing of dry sugar into liquid sugar for making cereal coating syrup. Here, operations are carried out in this manner:

Carload shipments of bagged sugar are manually dumped into a 10-bag-capacity covered hopper, which is located alongside a spotted box car. Free-flowing sugar is then fed through the gate-regulated hopper onto a Link-Belt oscillating conveyor (2x30 ft.) at a 500-lb.-per-min. rate.

Sugar is then discharged into a 600-gal., stainless steel, steam-jacketed (30-lb. steam pressure) kettle, which is equipped with vertical-type agitator and steam coils (125-lb. pressure). Water is automatically fed into the kettle with the incoming dry sugar. Liquid sugar (67-69 Brix) continuously discharges into a 400-gal.-capacity screening-surge tank. Temperature of liquid sugar is automatically controlled and recorded on a panel board.

Accent on Instrumentation

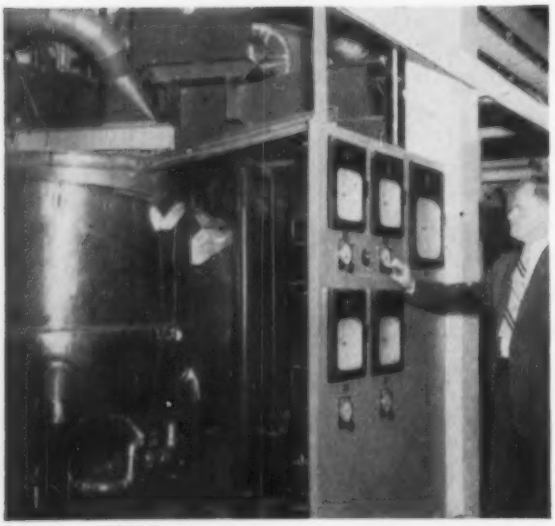
"In-stream" specific gravity of syrup at overflow point of melting kettle is instrument-controlled. Volume of inflowing water is automatically adjusted in accordance with a continuously measuring density device.

Liquid sugar flows at a 75-gal.-per-min. rate into the 3-baffle clarifying surge tank. Height of liquid in this tank is float-level controlled.

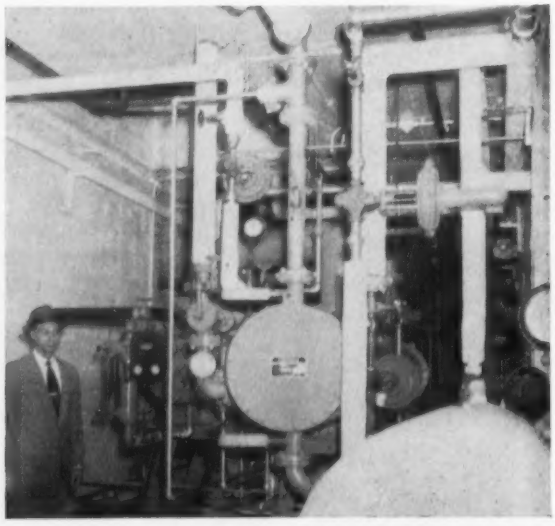
The 190-deg.-F. liquid sugar is dropped in temperature to 120 F. in the flash cooler, operating under a 28-in. vacuum. Cooler operates in conjunction with a surface condenser that is evacuated by a 2-stage steam ejector (125-lb. steam pressure).

Syrup level in flash cooler is automatically maintained by a liquid-level controller. Vapor is passed on to a condenser (1,900,000 Btu's per hr. capacity). Cooled syrup is then pumped into storage tanks.

Continuous System for Making Liquid Sugar From Dry



DRY SUGAR is conveyed from box cars into this instrument-controlled melting kettle. Rate: 75 gal./min.



HOT LIQUID SUGAR is flash-cooled before use with other ingredients to make coating syrup.

SPAGHETTI in final drying stage. Losses here are decreased when gum gluten is added to flour blend.

Better Macaroni Products With Gum Gluten

When added in sufficient quantity to raise protein content to 12-13% decided improvements in mechanical strength, texture, flavor are noted

JAMES J. WINSTON
Director, Jacobs-Winston Laboratories, Inc., New York

Increasing the protein content of macaroni products to 12-13% by addition of gum gluten to the farinaceous materials improves them in a number of ways.

- **It imparts mechanical strength to the extruded, dried macaroni.**
- **It gives better texture, flavor, and palatability to the cooked products.**
- **It increases volume and weight on cooking, with a decrease in dissolved solids in the cooking water.**

These are the findings resulting from a study undertaken to determine what effect addition of gum gluten* to wheat blends—75% hard wheat, 25% durum—would have on macaroni products made from them.

For the past two years, the durum wheat crop, which provides most of the raw material in the manufacturing of macaroni and noodle products, has been subjected to stem rust, particularly 15-B. This has resulted in a yield insufficient to supply the total industry requirements (FE Apr., p. 224).

Because of this shortage, millers have begun to sell a blend consisting primarily of 75% hard wheat and 25% durum. This mixture contains approximately 10½% protein.

Use of this blend has caused some processing difficulties owing to the inferior nature of the protein. In the manufacture of variety forms such as lasagne, tafole, and shells, special precautions must be exercised in order to obtain products of good workmanship.

In the study reported here, the following factors were evaluated:

1. Optimum quantity of gum gluten to produce a macaroni product with the most desirable cooking qualities.
2. Mechanical strength, which has always been regarded as one of the criteria of quality.
3. Effects of gum gluten on color.
4. Determination of cooking qualities.

Preliminary experiments were conducted to determine the amount of gum gluten to add, and the best way to incorporate it in the farinaceous ingredients so as to promote uniform distribution in the dough.

The spaghetti products were manu-

* Gum gluten is derived from wheat, and is made essentially by washing out the starch from the flour. The residue is carefully dried at a low temperature, to produce a gluten product that will reconstitute easily and will retain the necessary properties of binding and elasticity. Protein content will vary from 70-80%, depending on degree of processing.
Gum gluten used in the experiments, was obtained from the Huron Milling Co., Harbor Beach, Mich.

factured under strict supervision and made from the same farinaceous ingredients. In our investigation, we made use of a blend comprising 75% farina admixed with 25% durum semolina. Batches were manufactured, using the same mixer, kneader, hydraulic press, and similar drying rooms. Pressure during extrusion was maintained at the same level.

Three samples of spaghetti were manufactured: Sample No. 1, laboratory No. 71347, constituted our standard spaghetti with no gum gluten added; Sample No. 2, laboratory No. 71348—brought to a level of 12% protein with gum gluten; Sample No. 3, laboratory No. 71349—brought to a level of approximately 13% protein. Analyses of these samples are given in Table I.

The question of mechanical strength has always been regarded as one of the criteria of macaroni quality.[1] A good product should be capable of being bent, should be hard, translucent and elastic. Consequently, effect of gum gluten on the mechanical strength of spaghetti products was evaluated.

In our laboratory, we determine the strength of a product by its resistance to breaking.[2] The average breaking strength of 10 strands is taken as the breaking strength of the product. Individual breaking tests seldom vary more than 10% in the same sample. Results of this test on the three samples are given in Table II.

It is to be noted that, as the protein content is increased, resistance to breakage becomes greater.

The three samples were also evaluated for color, since this has always been considered an important criterion of quality.[3,4,5,6] Color was determined by chemical means (measuring carotenoid pigments), and by visual tests to determine the reflected light, using the Wallace & Tiernan disk colorimeter.[6] (See Table III.)

Results of this test showed that, when protein contents was increased to 12% by use of gum gluten, there was no reduction in color score. Raising the protein content above 12% by means of gum gluten, reduces slightly the carotenoid pigments and percentage yellow, and increases the brown. A spaghetti product should have a maximum of yellow and a minimum of brown, in order to create the best color appeal.

In another experiment, changes taking place during cooking were determined. It was deemed advisable to ascertain percentage increase in weight and volume after cooking, and also the dissolved solids in the cooking water. Preliminary experiments were conducted to determine the cooking time of each sample (see Table IV).

Products were cooked in accordance with the following standard procedure:[6]

Spaghetti (8 oz.) is dropped into 2 qt. of boiling tap water, containing 1% salt. Product is boiled briskly for the stipulated time after the spaghetti is dropped in the water. Product is then drained through a colander, or strainer.

Our experiments showed that, by maintaining the cooking time for the various spaghetti, as stipulated in the above table, the resulting cooked product had approximately the same degree of tenderness.

Cooked products were examined carefully, and the following determinations were made: (1) Percentage weight increase; (2) percentage volume increase; (3) percentage of residue.

In each instance, four cooking tests were made of each individual product. Average results appear in Table V.

Results of these tests showed that, as the protein content is increased by addition of gum gluten, there is a slight increase, both in volume and in weight, and a decrease in the amount of dissolved solids in the cooking water.

It is to be noted that, where the spaghetti is cooked for the longest time—Sample No. 3, 17 min.—there results the least amount of residue because of the protein having been raised to 12.7%. This product should serve the canning interests, since it retains good resiliency and appearance after vigorous heating.

The spaghetti containing the added gum gluten, after cooking, showed an improvement both as to texture, flavor and palatability.

(Turn to page 187)

Approved By FDA

In 1946, FDA promulgated an addition to the Standards of Identity for macaroni and noodle products, providing for the use of gum gluten in such quantity that the protein content of the finished goods be not more than 13% by weight.

This resulted from a hearing in Washington, in which macaroni and noodle manufacturers requested the optional use of gum gluten to supplement the natural proteins of farinaceous material—semolina, flour, and farina. At that time, the protein content of raw materials was lower than 10%. This deficiency resulted in difficulties, particularly, in the manufacturing of variety forms of macaroni and noodle products.

Roundup of Test Data

TABLE I—ANALYSIS of Spaghetti Samples

Laboratory Number	Protein (Nx5.7) (Percent)	Ash (Percent)
71238	73.73*	....
71347 (Sample No. 1)	10.76**	0.51
71348 (Sample No. 2)	11.97**	0.51
71349 (Sample No. 3)	12.70**	0.52

* Calculated to a moisture-free basis (dry basis).
** Reported on a 12% moisture basis.

TABLE II—STRENGTH of Spaghetti Increased With Addition of Gum Gluten

Sample No.	Breaking Strength (Grams)	Increase (Percent)
1	40.4	....
2	43.8	8.4
3	44.5	10.1

TABLE III—COLOR CHANGES Were Slight Due to Added Gluten

Sample No.	Yellow (Percent)	Brown (Percent)	Color (Ppm.*)
1	10	17	1.0
2	10	17	1.0
3	8	19	0.80

* Carotenoid pigments in terms of carotene in parts per million.

TABLE IV—COOKING TIMES are Increased With Added Gluten

Sample No.	Cooking Time (Min.)
1	13
2	15
3	17

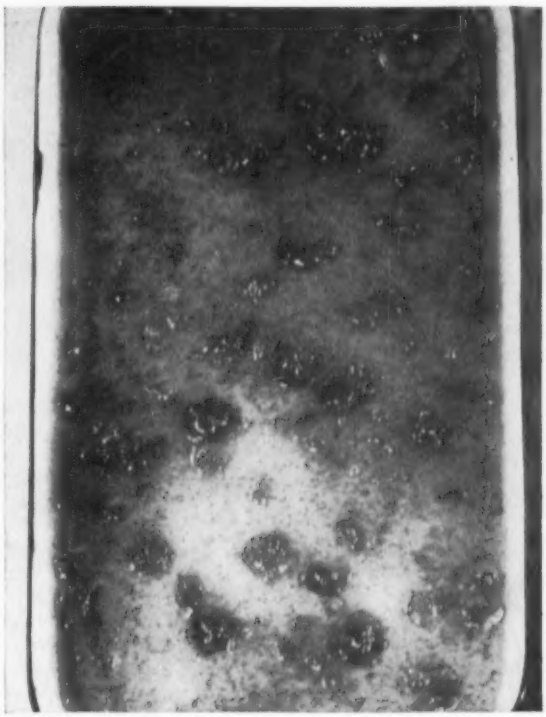
TABLE V—VOLUME and Weight Increases, Residue Falls With Extra Protein

(Average of four cooking tests)

Sample No.	Volume Increase (Percent)	Weight Increase (Percent)	Residue (Percent*)
1	194.5	152.0	5.73
2	199.0	154.0	5.20
3	201.0	170.9	5.18

* Dissolved solids in cooked water indicate degree of disintegration.

OXIDATION during freezing and thawing is prevented when fruit is capped with granular corn syrup solids.



PRESERVES made from frozen fruit capped with corn syrup solids have improved color, flavor, and texture.

CORN SYRUP

Is More Than a Sweetener

It increases shelf life of candies, imparts chewyness to chewing gum, controls crystallization in frozen products, preserves, jams, jellies. Aids canners, frozen food packers, bakers, in many ways

FLOYD A. LEWIS
Corn Industries Research Foundation, Inc., New York

The demonstrated advantages of corn syrups, both as sweeteners and for other purposes are leading to increased use of these ingredients in processed foods of various types.

They are of special interest because they:

1. Are less sweet than sucrose
2. Are hygroscopic
3. Inhibit crystallization
4. Impart desirable body or textural characteristics.

All of these properties are obtainable over a considerable range in the various types of syrup now commercially available, and usually at a saving.

With reference to sweetness, this property is not measurable with scientific accuracy. However, when combined with sucrose, which is the usual practice, corn syrup is generally considered to be about two-thirds as sweet as the former. This reduced sweetness is an asset in many foods, especially delicately flavored ones.

Its hygroscopic properties make corn syrup valuable for products like confections where moisture retention is necessary for long shelf life. Its ability to control crystallization of sucrose is also important here as well as in ice cream and preserves.

In certain types of confections and in chewing gum, corn syrup helps to provide essential chewy texture. Here, it furnishes nutritive body without excess sweetness—a factor also desirable in ice cream and other frozen desserts.

All From Corn Starch

Corn syrups are made by the partial hydrolysis of corn starch, principal end product of the corn-refining industry. Different types are made by varying the degree of conversion. All contain dextrose, the sugar resulting from complete starch hydrolysis, maltose, "higher sugars" and dextrins. The higher sugars resemble maltose.

Degree of conversion is indicated by percentage of reducing sugars, calculated as dextrose on a dry basis and referred to as "dextrose equivalent" or D.E. Corn syrup also is available in dried form, known as "corn syrup solids." Except for moisture content, its composition is identical with that of the syrup from which it is made. Latter contains approximately 19% moisture whereas former has about 3½%.

Approximate carbohydrate composition of three major types of corn syrup is given in the accompanying table. As may be noted the higher the D.E. of the syrup, the higher the percentage of dextrose and the lower the percentage of dextrins. Thus, the higher the degree of conversion, the sweeter the syrup and the lower its viscosity. Crystallization inhibiting properties vary inversely with degree of conversion, the lower-conversion heavier-bodied syrups being superior in this respect.

APPROXIMATE CARBOHYDRATE CONTENT of Three Major Types of Corn Syrup

Carbohydrate	Type Syrup: Regular (42 D.E.)	Intermediate (54 D.E)	High Conversion (62D.E.)
Dextrose	22	34	36
Maltose	21	27	34
Higher sugars.	20	12	19
Dextrins	37	27	11

Confectionery Uses

Candy manufacturers are by far the largest users of corn syrup, having consumed almost ¾ billion lb. in 1954. This is equivalent to about 26 lb. for every 100 lb. of confectionery sold.

How it aids confectionery manufacturers can best be understood by discussing its use in various types of candies.

In the case of hard candies, which are essentially supersaturated supercooled solutions containing little moisture, crystallization is usually prevented by adding corn syrup. It also gives these candies a desirable transparent glossy appearance. For open-fire cooking, a blend of 70% sucrose, 30% corn syrup is common. The syrup may be increased to 40% where vacuum cooking is employed, and some use up to 60% successfully.

In chewy confections such as kisses, caramels, gums and jellies, corn syrups of high dextrin content are widely used since they contribute to desirable chewiness without excessive hygroscopicity. They also account, in part, for this essential characteristic in chewing gum, where sweeteners make up 70-80% of total weight, and corn syrup high in dextrins comprises from 60-70% of this.

Candies such as frappes and marshmallows are made with blended sweeteners containing up to 60% corn syrup so that the mixture remains unsaturated with respect to sucrose. All types of syrups are used here, depending on desired sweetness, body, and texture. In some cases high-conversion syrups comprise 100% of the sweetener.

Grained confections such as fondants, creams, nougats and fudges are made with smaller proportions of corn syrup because here a crystalline texture is desired. Blended sweeteners containing 20-30% corn syrup are common in these products. In creams, most of the syrup is added last so as to preserve the desired texture. The homectant properties of the syrup keep them soft and palatable. At the same time, the sweetener level is high enough to prevent growth of microorganisms. All types of corn syrups are used, the high-conversion types imparting a greater humectant effect.

Blends of corn syrup and sucrose in approximately equal portions are common in gum confections, but greater amounts of the former are successfully used in some cases. Regular corn syrup is most often used, although the high-conversion ones are sometimes employed where humectant properties and extra sweetness of these types are desired.

Corn syrup also is used in the preparation of engrossing syrup for coating panned goods such as jelly beans and Easter eggs.

Ice creams and other frozen deserts containing corn syrup have earned high awards at many "taste clinics." According to a survey conducted by USDA, manufacturers have found that body and texture are improved, and that a smoother product with better "melt down" results, from use of corn syrup. It provides nutritive body without excessive sweetness. At the same time, it helps promote a smooth texture by retarding formation of coarse ice crystals.

Better Frozen Products

Since the flavor-producing ingredients of frozen desserts are perhaps even more important than sweetness from the standpoint of taste appeal, the effect of corn syrup on these materials must be considered. Tests have shown that true fruit flavors as well as those of natural fruits are definitely enhanced by the presence of corn syrup. Generally used is a combination containing 25% corn syrup (dry basis), but some manufacturers use higher percentages successfully.

In sherbets and water ices, which contain about twice the amount of sweetener found in ice cream, corn syrup prevents surface crusting due to crystallization, as well as separation of solids from liquids. Corn syrup may advantageously comprise 50% or more of the total sweetener.

Jams, Jellies and Preserves

Because corn syrup prevents crystal formation in jams, jellies, and preserves, it has a prime advantage as an ingredient of these products. The action of the syrup here is much the same as in a confectionery. And the natural fruit flavor in jams, jellies and preserves are not masked by its mild sweetness.

Food chemists explain the preserving process as essentially one of effecting sugar concentration while at the same time "preserving" the natural characteristics of the fruit and its juices. Corn syrup appears to facilitate this action so that preserves containing it have improved color and texture. Furthermore, these qualities are maintained over a longer period of time, giving the product a longer shelf life. Better color retention is noted particularly in the red fruit spreads.

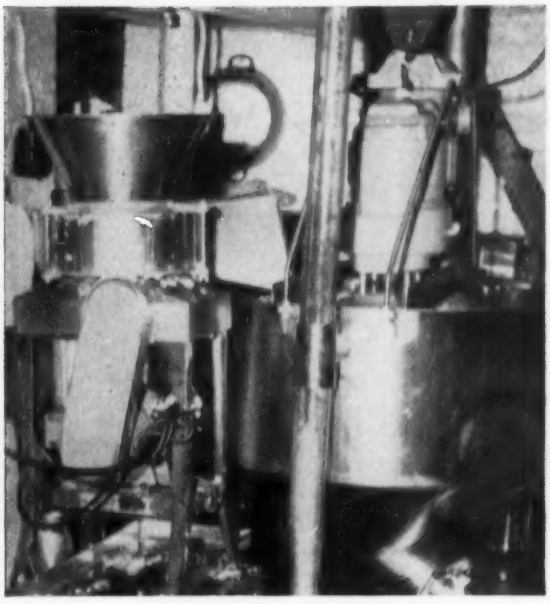
Federal food standards authorize the use of corn syrup in jams, jellies, preserves and fruit butters in quantities up to 25% of total sweetener content (dry basis) without label declaration. Many processors of high-quality goods are using it in this proportion.

Canned and Frozen Foods

Its economic and other advantages have led to the wide use of corn syrup in preparing canned foods. Fruits canned with blended sweeteners show

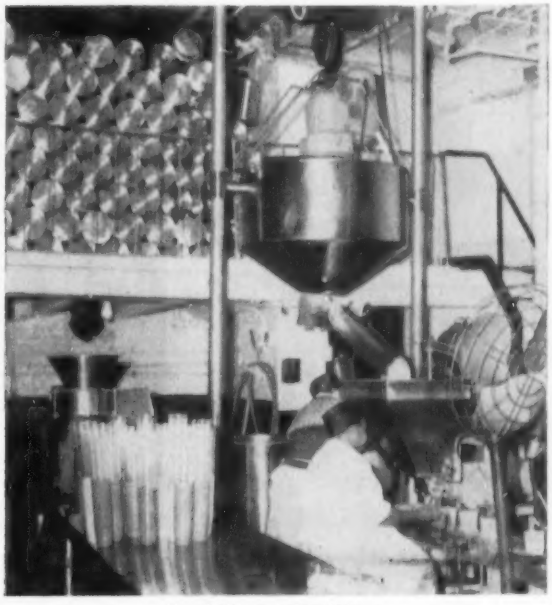
(Turn to page 195)

CORN SYRUP is piped to use points, generally through sanitary lines and meters that deliver accurately measured quantities.



In DOWN (↓) Position

Cooked potatoes are sliced (left), fall into bowl. Other ingredients are added, and mixing starts.



In UP (↑) Position

Potato salad discharges through slip-on chute to filler hopper. Note slide-valve under mixing bowl.

Curbs Product Breakup in Mixing

New unit employs improved, variable-speed blades for uniform distribution of ingredients . . . Hoist gives ready transfer to filler

FE STAFF

Question that faces many a processor is this–

"How can *fragile foods* such as potato salad, cottage cheese curd, fruit mixes, and preserves be mixed properly, yet gently, and then transferred, with the same care, to filling units —without breaking up the delicate product?"

This poser was long tussled with by Cosmo Salads of Brooklyn, maker of potato salad that is packaged in 1-lb. plastic containers for distribution to food stores throughout the Metropolitan New York area.

–And finally the answer was hit upon by adoption of a "Duo Action" mixer that gently, but uniformly mixes as it elevates.

The unit comprises a stainless steel tank employing pitched vertical and semi-horizontal agitators that provide a constant plane change (see drawing). One side of the agitator is longer than the other so that each vertical blade mixes in a different arc. At the same time, the semi-horizontal blades lift and roll the product over.

Mixer is suspended from an electric hoist by which it is elevated to the desired emptying height, and lowered to the floor for filling. Its movement is guided by two pipe supports.

Making Potato Salad

In operation at the Cosmo plant, potatoes that have been abrasive peeled, cooked for 30 min. at 20 lb. steam pressure in a horizontal retort, inspected and "eyed", are fed to a portable Urschel slicer. This unit discharges directly into the mixer (left photo).

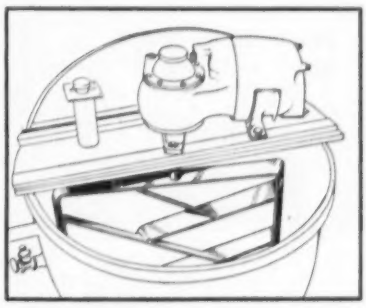
Additional ingredients–mayonnaise, onions, vinegar, sugar, salt, pepper– are added and mixed with the sliced potatoes.

While mixing is in progress, mixer is raised by the electric hoist to a height that enables gravity discharge –through stainless slip-on chute–to the Anderson plunger-type filler (right photo). A slide-valve regulates the flow, freeing one man–formerly used in hand transfer–for other duties.

Plastic containers are fed to filler conveyor by hand and filled ones are hand-capped. Mr. J. Burstein, owner of Cosmo, has been unable to obtain satisfactory mechanical cup-feeding or capping units to handle the plastic containers.

Held under proper refrigeration at

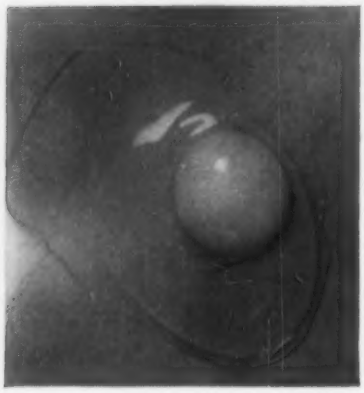
(*Turn to page 183*)



PITCHED-blade arrangement means no "dead spots" in this mixer.

What Cathode Rays Do

Untreated Eggs Have Thick Albumen, Uniform Shape When . . .

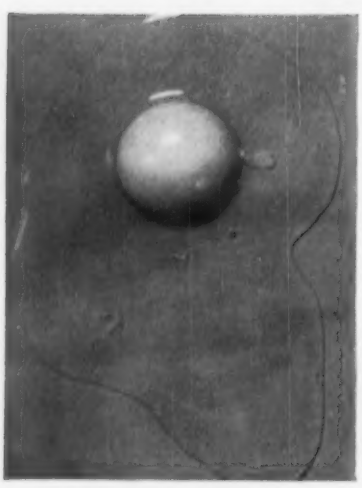


. . . Broken out

. . . Fried

. . . Or hardboiled

But Those That Are Irradiated . . .



. . . 'Run out' when they're broken (albumen thinned)

. . . Have 'spread,' stale look when fried

. . . Are marred by misshapen, off-set yolk when hardboiled

N. W. DESROSIER, F. J. McARDLE, H. A. HOLLENDER and W. W. MARION

Agricultural Experiment Station, Purdue University, Lafayette, Ind.

Without doubt, cold sterilization of foods offers you exciting possibilities–negligible temperature rise for heat-sensitive items, then storage and distribution of "perishables" without refrigeration.

But many problems remain to be solved (FE Sept. '54, p. 70) before the potential of this method is realized. Of primary concern are the undesirable changes in flavor and appearance that result from the ray treatment.

The obvious changes that take place in foods high in protein and moisture suggest the former component as a probable cause. Therefore, experiments were conducted using fresh shell eggs and raw skim milk.

Results of this research indicate that–

1. Inoculated, fresh shell eggs can be sterilized with a radiation dose of 600,000 rep. (Roentgen equivalent physical), but quality is lowered in the process. However, cooking tends to overcome some of the objectionable "stale" flavors.

2. In raw skim milk, rays produce undesirable flavor changes, increased rennet coagulation time, and a decrease in casein heat stability. Latter is an important factor if heat-inactivation of enzymes is considered. On the other hand, concentrating the milk before irradiation reduces side reactions and generally yields a more acceptable product.

Our radiation source was a 4 MEV. (million electron volt) linear accelerator developed by the physics department of Purdue University. Theoretically, this unit produces 10,000,000 rep. per sec., but it was modified to yield 100,000 rep. per min. for research on eggs.

To Eggs and to Milk

Samples were gathered from control groups of hens at the poultry department farm. Then, Haugh unit averages (measures of quality) were used to separate eggs into four unit classes (80, 75, 72, and 60).

Sterilizing Shell Eggs

To establish the required sterilization level, we prepared suspensions of common egg contaminates (*E. coli*, *S. Marcescens*, and *Ps. fluorescens*) in phosphate buffer. These three organisms were then mixed into one suspension which was diluted to contain 1,000,000 cells per ml. The apex of each egg (average size 20-25g.) was pierced and 1 ml. of inoculum injected near the yolk. Holes were sealed with colloidin.

Eggs were irradiated at various levels, blended, and incubated at 86 F. Plate counts taken on nutrient agar established the sterilization dosage at 600,000 rep., which includes a safety factor. Treatments and controls were run in parallel.

How irradiation sufficient to sterilize the inoculated eggs reduces quality is shown in the lead photos and in the following Haugh unit averages for treated and control samples:

Class	Control	Irradiated
80	79	38
75	70	32
72	69	37
60	61	29

Taste Panel Results

Flavor changes were not objectionable in any of the eggs when fried, scrambled, hard boiled, or baked in a cake. They were apparent, however, when eggs were soft boiled in the shell. This off-flavor was readily detected and usually described as "stale".

Irradiation thins the albumen of fresh shell eggs. When fried, these eggs spread to give a stale appearance. When hard boiled, they show characteristics of poor quality.

No reduction in enzyme activity, as evaluated by lysozyme studies, resulted from irradiation. And no recovery from radiation damage was noted in treated eggs on storage.

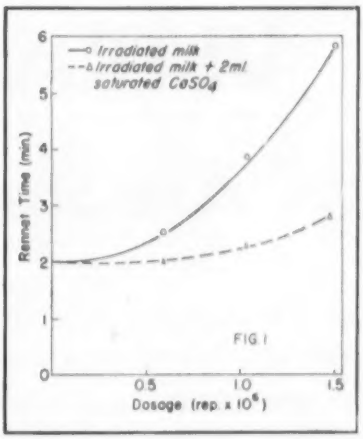
Influence of Rays on Skim Milk Protein

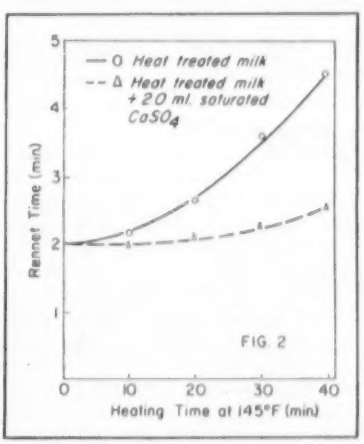
A special sample cell was employed with the accelerator, in tests on raw skim milk.

Increasing doses of radiation resulted in an increased rennet coagulation time and a decrease in stability of casein to heat. The increase in rennet time closely resembles that change resulting from heat treatment of milk. Fig. 1 summarizes effects of various doses of radiation with and without addition of calcium sulfate, while Fig. 2 shows results of various heat treatments under the same conditions.

Addition of calcium to irradiated or heated milk resulted in a recovery of the rennet reaction rate. In these tests an excess of calcium was present. Coagulation time was not reduced to control levels in either case, but fell

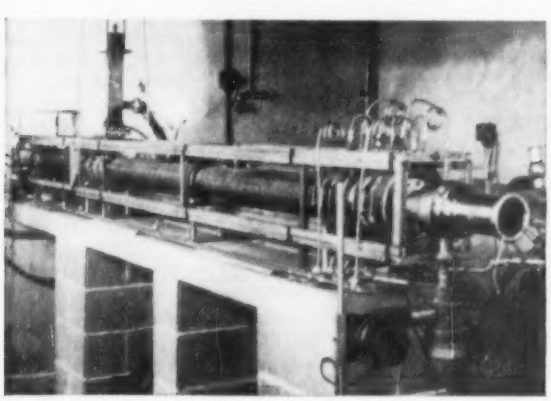
(*Turn to page 214*)

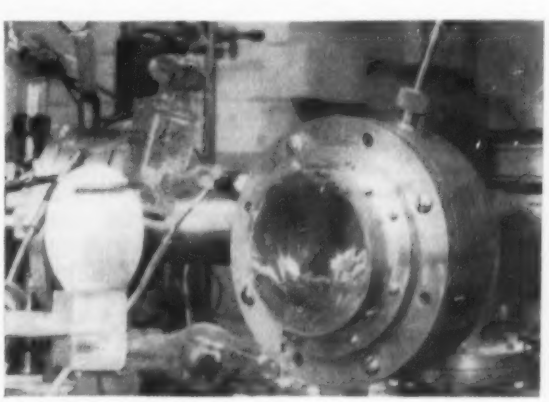




Milk Curves

SKIM MILK shows similar increase in rennet coagulation time when irradiated (top) or heat-treated (above). But addition of calcium ups both reaction rates.





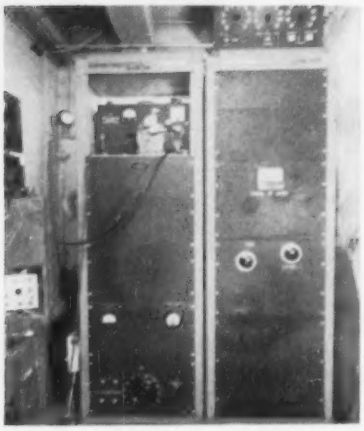
Closeup of Ray-Test Equipment

PRODUCTS were sterilized in 100,000-rep. Purdue linear accelerator, components of which are seen above. Left photo: Electron gun (right foreground) injects electrons into barrel, through which they are accelerated. Particles then hurtle into ionization chamber (right photo), where several thicknesses of aluminum foil form a "window" that scatters them into a cone-shaped beam. Note egg (left) in position for irradiation.

How Food ULTRASONICS Are Shaping Up

Many applications are still "in the lab." But sound waves show cost-cutting, process-improving potential . . . Among techniques cited are those for dairy products, sugars, starches, hops, and grain . . . Bactericidal properties of ultrasound described. Wave generation detailed

Wave maker . . .



HIGH-FREQUENCY sound waves are produced in this generator (as in a radio transmitter) when high potential is applied across a piezoelectric crystal. From generator, ultrasound is transmitted to . . .

R. McL. WHITNEY
Associate Professor of Dairy Technology, University of Illinois, Urbana.

As a useful tool for the food engineer, ultrasonic waves are characterized by two key properties—

1. They may—like light waves—be focused, since they are directional.
2. They can be controlled.

Thus, striking effects may be produced: Destruction of bacteria, preparation of emulsions, and depolymerizing of starch and gelatin.

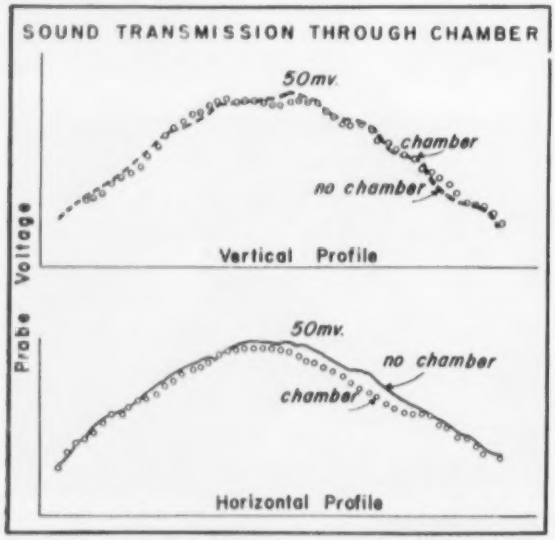
True, many existing methods may still be cheaper and generally adequate. Rather, it is where present techniques might be improved or costs cut that ultrasound has definite potential. Of course, much work remains to be done before the potential is realized.

With special emphasis on bactericidal effects, we will describe generation, pertinent properties, and both present and proposed applications of the waves.

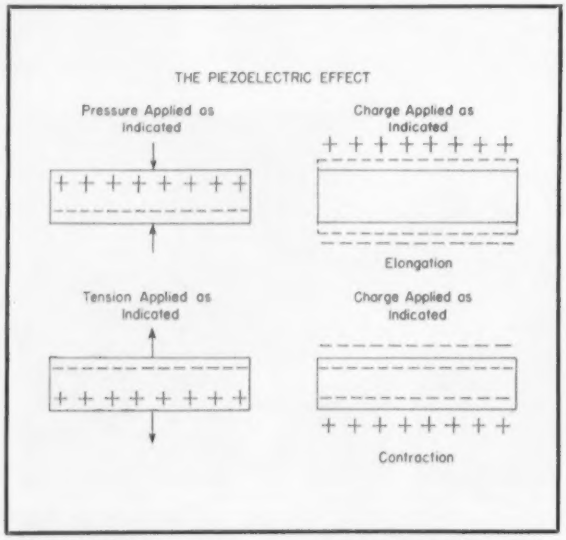
A Closer Look

Ultrasound can be produced in several different ways, but the most suitable method for the food processor is with the piezoelectric generator. If certain natural crystals, such as quartz, are cut so that opposite faces are perependicular to the polar axis (figure at lower right), and pressure is applied to these surfaces, charges of opposite sign appear on them.

This phenomenon (called piezoelectricity from the Greek word for pressure) is due to changes induced in the spatial relationships of ions in the crystal.

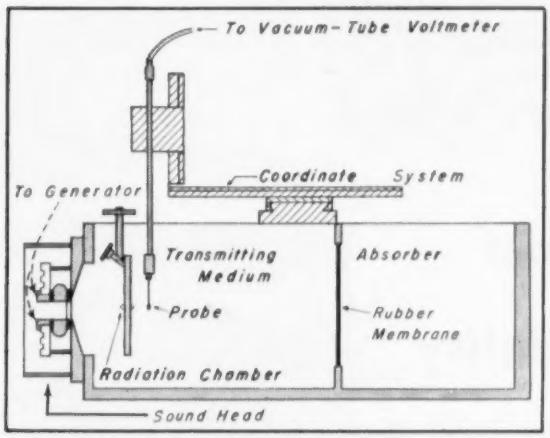


DEGREE OF PERFECTION in transmitting ultrasound is shown in graph form by these horizontal and vertical profiles of the field—with and without the radiation chamber in place.



PRODUCTION of sound waves piezoelectrically. High-frequency alternating potential applied across crystals (rectangles on right) alternately elongates and contracts them.

. . . and lab test rig



. . . STERILIZATION TANK, where waves pass horizontally from sound head to sample radiation chamber. Then they go on through a rubber membrane to be absorbed in castor oil. This membrane is acoustically matched with the adjacent media (water and oil) to prevent reflection of energy at the interfaces.

The reciprocal effect is also observed. Application of charges of opposite sign to opposite faces produces an elongation or compression of the crystal in the direction of the polar axis. And, reversing the charges reverses the effect.

If a high frequency alternating potential is applied across its surface, the crystal will attempt to vibrate at its natural frequency or some harmonic. This property of the crystal depends upon its elasticity and thickness. Maximum intensity of vibration is obtained when applied and natural frequencies of the crystal are identical.

A generator based upon this principle is shown in our photo. The high frequency, high potential applied across the quartz crystal is produced in the cabinet in the same manner as in a radio transmitter. Frequency of operation is determined by thickness of the crystal selected and, for the same material, is inversely proportional to it.

At resonance (natural and applied frequencies identical), amplitude of vibration is proportional to applied voltage. Within recent years there has been processed a special ceramic, barium titanate, which possesses piezoelectric properties and yet can be molded into any suitable shape.

Sound waves are produced by vibration of a source—such as the diaphragm of a loud speaker—in a compressible medium. Here, a series of compressions and expansions is created. And when sources vibrate from 60 to 16,000 times per second, a sound is heard.

But when the frequency is higher—from 20,000 to 500,000,000 times per second—we have ultrasound which is inaudible. At these very high frequencies, distance traveled back and forth (called amplitude of vibration) becomes extremely small, while accelerations involved are very great.

At a frequency of 300 kilocycles per second, amplitude of vibration in water is about 0.0008 ins., while acceleration is that of a bullet fired from a rifle. Pressures and tensions of more than 75 psi. may be produced with every vibration. Such conditions literally tear a liquid medium apart, to form tiny cavities which are then violently collapsed. This phenomenon is called cavitation.

Scientists have considered the possibility of applying ultrasound to problems of food processing for some time. Its ability to make a very stable, highly dispersed oil-in-water emulsion has suggested preparation of mayonnaise and other salad dressings, homogenization of milk, and altering of jelling properties of gelatin and pectins by depolymerization.

Of greatest interest, however, is its use as a possible substitute for heat sterilization of heat-sensitive materials, because of its ability to destroy bacteria.

Bactericidal effects of ultrasound have been conclusively demonstrated by numerous investigators, including Beckwith and Weaver,[1] Yen and Liu,[2] and Chambers and Gaines.[3] A method of sterilizing milk, using ultrasound of 3,000 kcps. in pulses of 3 milli-second duration, has been patented in England.[4] However, Keller and his co-workers[5] in Germany, also Tobler[6] in Switzerland, have not been successful in obtaining sterile milk by such treatment. Apparently, more definite information is needed with regard to conditions necessary for sterilization.

Equipment and Method

We at the University of Illinois, in cooperation with W. J. Fry and F. J. Fry of the Bioacoustic Laboratory of the Department of Electrical Engineering, and A. M. Buswell and L. Russell of the Illinois State Water Survey,[7] have been attempting to place bactericidal effects of ultrasound on a quantitative basis. That is, with regard to ultrasonic variables such as sound-pressure amplitude or intensity of vibration. Such knowledge is necessary before a proper evaluation of commercial use of ultrasound for sterilization can be made or specifications for commercial equipment can be outlined.

Work to date has been chiefly involved with development and selection of most appropriate instruments and techniques for quantitative control and measurement of ultrasonic and bacteriological variables.

An ultrasonic generator and tank assembly, such as shown in the lead illustrations of this article, was found suitable. It produces a traveling ultrasonic wave passing from the sound head horizontally through the water tank and sample radiation chamber and on through an acoustical rubber membrane to be absorbed in castor oil. Energy distribution in such an ultrasonic field is continuous from the crystal to the limits of the bath, and its intensity can be measured by means of the acoustical probe mounted on a coordinate system.

An electrically shielded housing with the face of the

What Next—And Where?

First, future of food-industry ultrasound depends on relative costs.

Take the acceleration of the ripening of cheese: If savings in time required exceed the cost of equipment and energy, wave techniques will undoubtedly be used.

But full proof of such savings remains to be secured.

While the empirical design of suitable equipment may lead the way, it is from the quantitative control of ultrasonic variables in investigating the particular applications that we must derive the basic information for developing the most efficient apparatus.

Second, problems of implementing the technique still remain, with other cases involving other factors—such as curbing off-flavor in homogenizing milk.

Further, in using ultrasound for sterilization to replace action of heat we may incur vitamin destruction. Under certain conditions, moreover, researchers were not able to inactivate lipase and some other undesirable enzymes.

And so, outlook for future food-industry ultrasonics is probably not so all embracing as some of its more enthusiastic promoters visualize.

But where present methods leave something to be desired—or where they offer possibilities for cost saving—there is a very definite potential.—*R. M. W.*

crystal in contact with the bath at ground potential eliminates all radio-frequency currents. This enables use of water in the bath, employment of probes in the ultrasonic field, and interpretation of ultrasonic effects no longer complicated by the influence of radio-frequency energy. Cavitation can be controlled or prevented as desired, and temperature control is quite simple.

It is also necessary that the sample under investigation have uniform treatment throughout in order to quantitatively interpret the results. Therefore, we studied different types of crystals extensively and plotted their ultrasonic fields with help of the acoustical probe in search of a uniform region of sufficient size to hold the sample chamber.

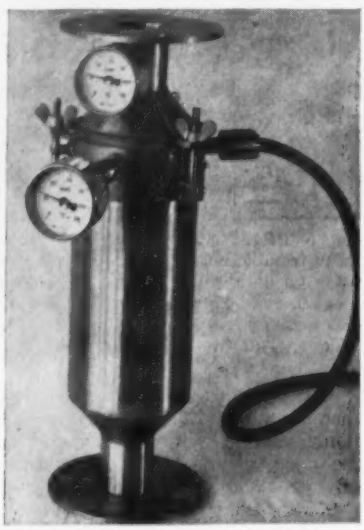
Such a region was found when a round, 1-in. quartz crystal was employed. Its dimensions are 40x10.2x8.8 mm.,

(Turn to page 159)

'Sonics Already Boost Chocolate Output, Quality

Conching time is cut in half when flavor of raw materials is pre-developed in sound wave unit. Other gains include cocoa butter improvement, also curbing of off-flavors in nut-filled items

GUSTAV MOSIMANN
Engineer, Meilen, Switzerland



AT TON-AN-HOUR RATE, this sound vibrator converts astringents in chocolate to achieve desired final flavor.

Although many of the ultrasonic food uses have not yet come out of the laboratory (as noted in the article above), nevertheless there have now been successful plant applications by European chocolate manufacturers.

Here, output has been doubled in a conventional room where conches handle 20 tons of chocolate at a filling—this without disrupting established production lines.

Further, quality of certain types of chocolate has been improved particularly with relation to flavor. Also, off-flavors have been eliminated in cocoa butter. And good results are reported for similar treatment of fatty or nutty fillings.

In these processes, sound-wave units are used to develop flavor, and the yardstick of their efficiency remains the conche—the conventional flavor-developing unit. This despite the fact that it is not strictly correct to classify ultrasonic devices as conches, since they can neither evaporate water nor plasticize a dry mass.

True enough, these purely physical processes could be accomplished in a simple heated mixer, with ultrasonic treatment added as a supplementary operation. However, the trend of the last 70 yr. has been to combine moisture removal, plasticizing, and flavor development in a single process.

Prime disadvantage is that treatment time, the controlling factor in developing flavor, cannot be shortened with conventional equipment alone.

But *pretreating* of raw materials with an ultrasonic unit like the Schoeller Ameliorator (U. S. Patent No. 2,469,557) permits a major reduction in conching time, hence increases production.

Cuts Conching Time

The following relates the points in application of this system to the processing of a "bitter" chocolate:

We note first that a typical longitudinal conche liquefies chocolate and drives off excess moisture and acetic acid in 30 to 36 hr. Its modern equivalent, the rotary conche, produces the same effect in 10 to 20 hr.

But at the end of this initial period, chocolate still tastes comparatively raw, since the tannin-like substances have not yet been converted. To finish the process, a longitudinal conche must run for another 36 to 60 hr., or an extra 15 to 25 hr. in the case of a rotary conche.

However, when chocolate liquor receives ultrasonic treatment before it is mixed with sugar or cocoa butter, work required of the conche is limited to the initial phase. Conversion of astringent compounds, with accompanying flavor development, has already been effected in a continuous pretreatment—at the rate of 1 ton per hour.

And in the production of milk chocolate, ultrasonic treatment accelerates the physico-chemical blending of the two main components—milk and cocoa. Again, this is analogous to the second phase of conching.

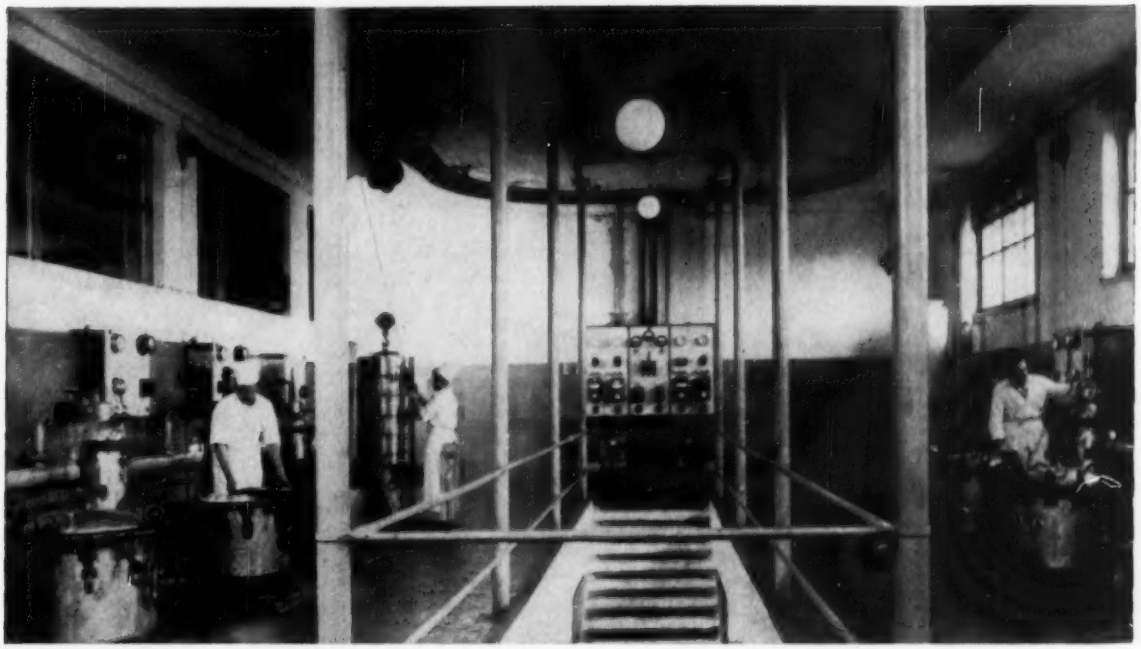
In this case, cocoa, milk powder, and a small amount of cocoa butter are worked to a free-flowing consistency in a heated mixer. Then, at a temperature of 122 to 140 F., the mass is put through the flavor developer at rates of 1,540 to 2,200 lb. per hr. Further processing is carried out in the normal fashion.

Removes Off-Flavors

Improving the flavor of pure cocoa butter is still another application. As is generally known, off-flavors in some types of cocoa butter are particularly noticeable when such butter is used in milk chocolates or in products containing finely ground almonds or hazel nuts.

Today, these undesirable flavors have been eliminated by ultrasonic treatment—with the one notable exception of the strong smoky flavor.

Finally, good results are reported for similar treatment of fatty or nutty fillings.



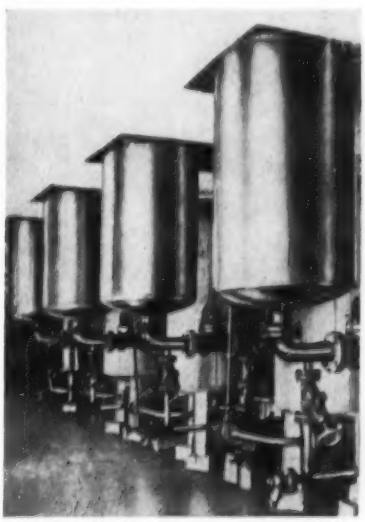
EIGHT of the new units, set in two banks, are keyed by centralized controls (center) in S.P.A. Motta plant, Lissone, Italy. Using special clamp, operator in left background loads baskets with monorail hoist. Vacuum pans are located behind retorts. This mezzanine installation facilitates loading of the units, which go through floor to form . . .

Engineered

Fruit Candying

Wins Big Savings in Time and Space

What's more, quality is also improved by new and revolutionary Italian equipment, despite fact fruit is whisked through in 12-36 hr.



. . . **BATTERY** of retorts, along with syrup storage tanks (background), on lower level. Note pumps and drain valves.

THESE FOUR striking advantages are being chalked up by fast and flexible fruit-and-peel candying equipment newly developed in Italy—

- **Continuous circulation of syrup through the product.**
- **Automatic strengthening of syrup.**
- **Low temperature operation, producing firm, shape-retaining fruit of better color and flavor.**
- **Completely enclosed unit that is waste-free and cleanly.**

Where formerly 1 to 3 weeks was required for processing, with this equipment candied fruit cubes (such as pineapple) are produced in 12 hr. and cherries in 24 to 36 hr. Standard half-cap oranges and lemons take about 36 hr. The large unit, designated the DMC/1000, will turn out 4,200 lb. of cubed fruit or 1,400 lb. of cherries in 24 hr.

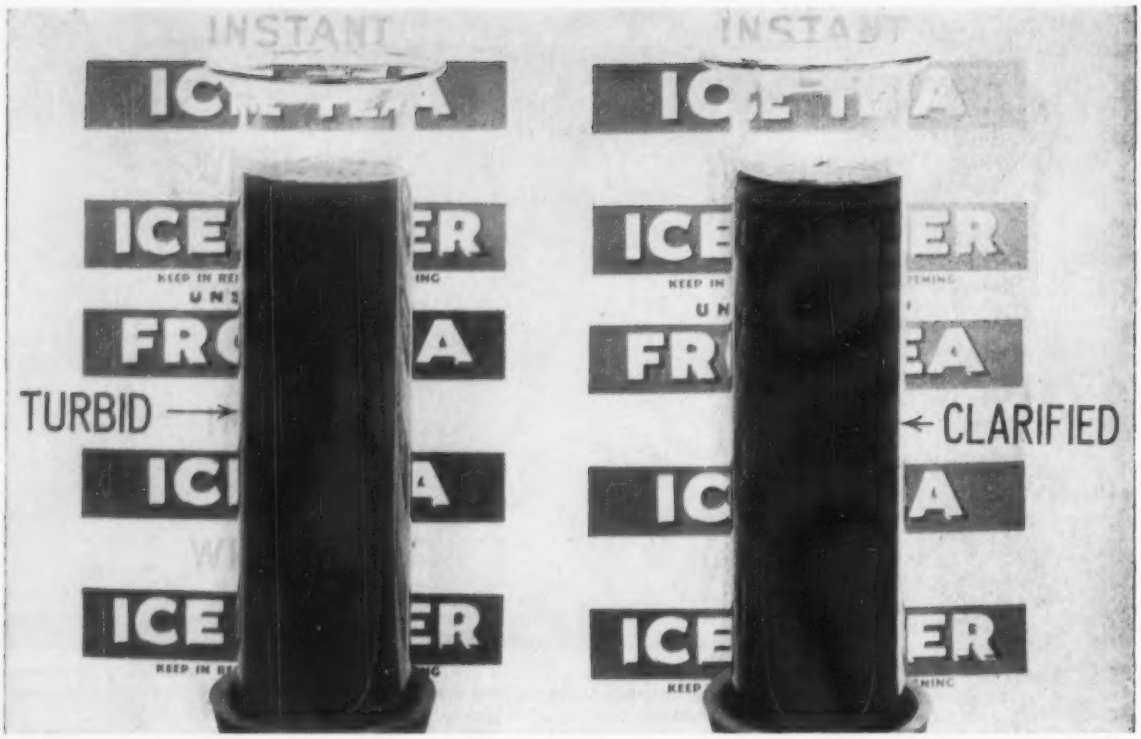
This candying unit consists of a vertical retort, vacuum pan with vacuum pump, circulating pump, and syrup storage tank—all constructed of stainless steel. Equipment controls are located on a central panel.

Steps in method: Fruit or peel is loaded into 4½-in.-deep, 34-in.-dia. stainless steel baskets. These baskets go into the retort, 28 to the batch. A unique clamp enables loading or removal of all 28 baskets as a unit.

Inside, the fruit is cooked under water, following which the water is drawn off and replaced with syrup.

Low temperature of the circulating syrup prevents graining. And in the vacpan, Baumé is increased automatically at the maximum rate fruit will absorb sugar. When required concentration is reached, syrup is withdrawn

(*Turn to page 184*)



HOW dextrose-glycerine solubilizes precipitate. **Left:** Unstabilized tea concentrate. Note turbidity that has developed on cooling. **Right:** Stabilized product is clear and it has natural color.

Proper Stabilization Keeps Tea Extract Clear

Precipitation of caffeine-tannin in cooled liquids is prevented by raising pH, adding sugars. Then sterilization assures good shelf life.

HERMAN LEVIN
Southwest Research Institute, San Antonio, Tex.

Addition of glycerine and dextrose to tea concentrate, the pH of which has been adjusted to 7.7-8.0, results in a product that retains its clear, attractive appearance, natural flavor, and aroma during extended periods of storage.

These findings resulted from research directed toward "solubization" of the light brown precipitate that forms in cooled liquid tea concentrates.

Many agents, including various sugars, glycols and glycerine, have been suggested as additives to tea brew.[1,2,3,4,5,6] Claimed results range from improved flavor and aroma retention, and greater clarity, to improved extraction of the tea leaves.

Use of certain agents at high concentrations, such as 50% sucrose in the tea brew, results in turbidity elimination in the cooled extract. But only at the expense of having a product that imparts a very sweet taste to the finished drink.

Since design of a protective colloid system requires knowledge of the colloid particles' participation in the turbidity formation, first effort was made to qualitatively identify this precipitate.

Composition, percent, of tea leaves[7], is: Caffeine, 3.5; tannin, 14.0; other solubles,* 28.0 (total solubles, 45.5); water, 7.0. Composition of a 2.5% soluble solids hot water extract is: Caffeine, 0.22; tannin, 0.75; other solubles, 1.53; Water, 97.5. The pH of the brew is 5.0, indicating that it is slightly acidic.

Chemistry of the tea tannic has not been completely defined. However, Russell and his collaborators[8,9] have concluded that it is a polyhydroxyflavpinacol on the pattern of bis (5, 7, 3′, 4′, 5′ pentahydroxy)flavpinacol. It has been found that the tea tannin particle, similar to other varieties of tannin, behaves when dispersed in water as a negatively charged hydrophilic colloidal particle.

*Carbohydrates essential oils, and inorganic salts largely.

A dispersed caffeine particle, on the other hand, by virtue of its basic ring nitrogen, behaves as a positively charged particle in the slightly acid, freshly prepared tea brew.

On this basis it would be suspected that the negatively charged tannin particles and the positively charged caffeine particles would mutually attract each other and thus precipitate and impart a turbid appearance to the brew. This mechanism was confirmed by qualitative identification of caffeine and tannin in the precipitate.

Proving the Theory

In an effort to simulate this mutual coagulation, separate dilute water solutions of caffeine and digallic acid (latter was chosen to simulate the weakly acidic properties of tea tannin) were made. When combined, two major effects were noted:

1. A white precipitate formed which re-dissolved upon heating. This demonstrated the thermal reversibility and reduced solubility at room temperatures of the tannin-caffeine coprecipitate. It also explained why turbidity in fresh tea brew occurs after cooling.

2. Addition of a few drops of base to the mixture caused the white precipitate to dissolve. This indicated that neutralizing destroyed the positive charge on the caffeine particle, and thus its ability to coagulate with the tannin particle.

These tests provided qualitative verification of the mutual coagulation mechanism between dispersed caffeine and tannin particles to explain the turbidity that occurs in tea brew. They also indicated that elimination of the charge of caffeine particles can be accomplished by making the solution alkaline.

Degree of alkalinity required to eliminate all turbidity, however, is so high as to cause undue color darkening and an unacceptable taste. This led to the conclusion that, while a considerable degree of particle stabilization can be accomplished by making the brew slightly alkaline, additional protection of the tannin particle is required in order to eliminate turbidity, retain flavor, and appearance.

Attacking the Problem

Solution of the practical problem of developing a satisfactory colloidal system proved to be somewhat complex. Since patent and trade literature contains numerous references to use of sucrose and various derived carbohydrates as protective colloids, investigation of the effect of functional groups of these carbohydrates seemed the likely starting place.

In an effort to reproduce the stabilizing effect of sucrose, action of a series of alcohols (mono- and polyhydric), sugars of varying carbon chain lengths and complexities, and derived carbohydrates were investigated. Of the alcohols (ethyl alcohol, ethylene glycol, glycerine, and d-mannitol), only ethylene glycol and glycerine were found effective. Dextrose, sucrose, lactrose, l-arabinose, and l-xylose were satisfactory when used in concentrations greater than 45% by weight.

Derived carbohydrates such as gum arabic, gum tragacanth, gum catechu, dextrin, agar, and pectin did not prove effective. In small concentrations—1 to 2%—they increase viscosity of the brew and thus impart body to the concentrate.

On the basis of these findings, binary and ternary systems employing combinations of the above agents together with pH control were examined. One of the best systems found contains dextrose and glycerine (see chart). Here, the curves show quantities of agents required at various pH's to prevent turbidity at refrigerator temperatures of a tea concentrate containing 2.5% total solubles.

Consideration of such factors as sweetness of final beverage and production costs indicated use of 5% glycerine, 15% dextrose and a pH of 7.8-8.0 to obtain optimum clarity (see photo).

Need for sterilization of the stabilized product was indicated by the moderately low concentrations of dextrose (5-15%) and tea solubles (2-3%) in a nearly neutral solution. This should constitute a fairly good nutrient media for many common microorganisms.

It was verified by shelf storage studies of unsterilized concentrates. Some of these concentrates were in sealed containers and others in alternate sealed and open containers. Still others were concentrates specifically inoculated followed by sealing.

Studies were therefore conducted to develop sterilization conditions necessary to prevent product spoilage. Protection of flavor and aroma required that conditions of minimum exposure be chosen. These were found to consist of heating to 180 deg. F. and holding 80 min.

Greater Concentration Needed

It is important to note that this brew contains only 2.5% tea solubles. A more highly concentrated prepara-

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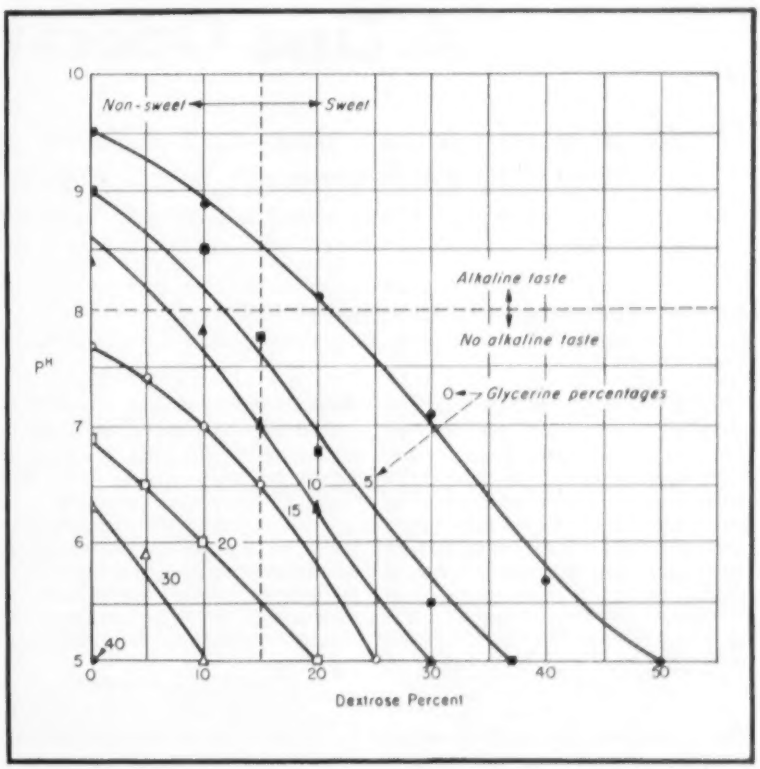
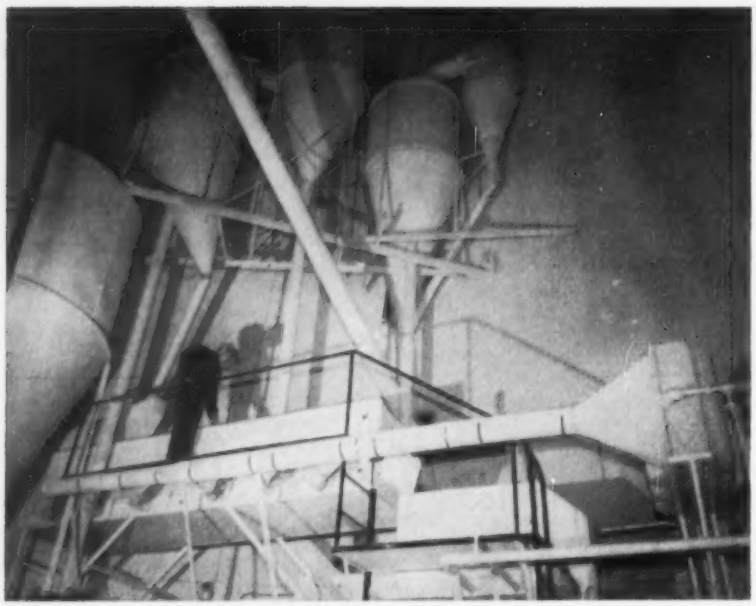
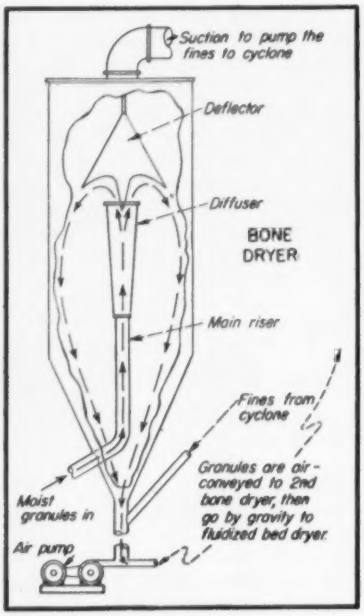


VARIOUS dextrose-glycerine-pH combinations prevent turbidity development. Taste zones are based on a drink composed of 2 tablespoons of 2.5% concentrate in 10 fluid ounces of water.



ADVANCED ENGINEERING of enterprising Simplot company is exemplified by these new "bone-dryers." Aided by fine product consistency . . .


Suction to pump the fines to cyclone
Deflector
Diffuser
BONE DRYER
Main riser
Fines from cyclone
Granules are air-conveyed to 2nd bone dryer, then go by gravity to fluidized bed dryer
Moist granules in
Air pump

. . . **UNIT DESIGN** assures "air-cushion" drying of granules.

How to *Unit-Engineer* A Line Operation

Tips on salient machine designs—ways of developing and applying them—are spotlighted by potato processor's dehydrating, freezing, and granulating systems . . . Plant handles 1,000,000 lb. of raw materials daily.

RAY W. KUENEMAN and C. R. HAVIGHORST

Respectively, Production Manager, J. R. Simplot Co., Caldwell, Ida., and Senior Associate Editor, "Food Engineering"

With excellent modern machines available, mechanizing your process lines can be a relatively simple matter. ▶ **But—not always does the "nut fit the bolt" so precisely. For line engineering can become decidedly complex when, due to specific process needs, you require equipment that just isn't on the market.**

"These are the problems that our engineers at J. R. Simplot Co., Caldwell, Ida., have been facing—and surmounting," said Leon Jones, manager. And it is the "how" of this experience that is detailed here—with attention invited to the practical, working techniques.

"Of course," continued Manager Jones, "we use a great number of commercially built machines, especially in our canning department. However, to mechanize several lines to optimum satisfaction, we've had to design and construct specialized equipment.

"This is from sheer necessity. For the fact is that process advances and new potato products have been developing so rapidly in recent years that they actually outstrip the equipment makers' production of specialized equipment."

Accordingly, management soon put the accent on engineering and technological research, recognizing that specific machines are not always available for processing new products. And this program has made possible the current high degree of mechanization of the company's three potato lines.

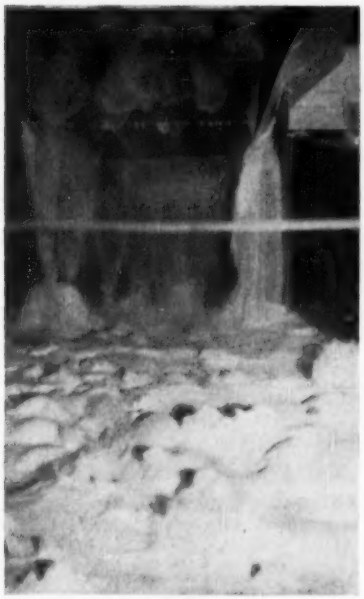
In truth, this policy goes even further: It makes current machines subject to use only until the plant engineers can supply something better to replace them.

And frankly, there can be little deviation from this industrial axiom at this plant. Because, unlike many other products, potatoes are in the low-priced group of staple foods. And, pricewise, they must compete on a nearly year-'round basis with fresh potatoes—as well as with competitors' products.

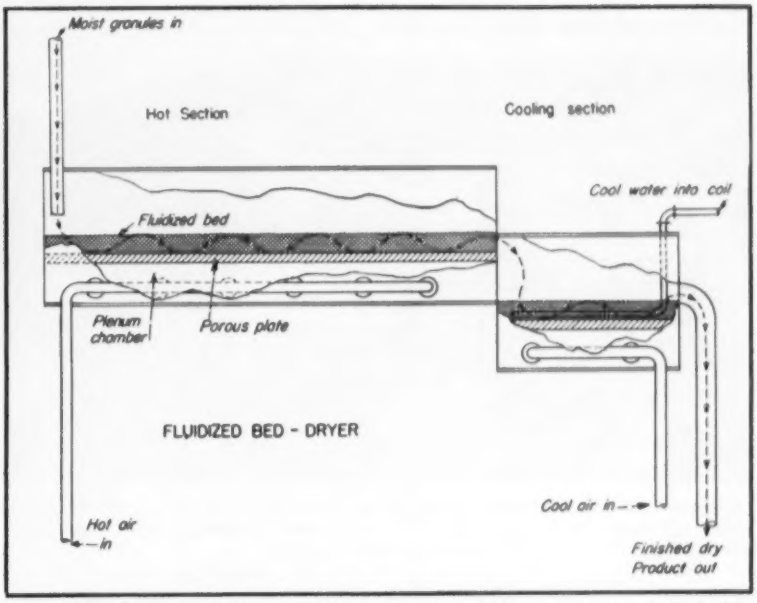
Now to the operations and engineering:

Raw Material Handling, Storage

Potatoes move from harvesting through storage in crate-like, 3,300-lb. bins. These are handled by lift-trucks.



THERE'S FURTHER dehydration in this newest fluidized bed-unit . . .



. . . **LAID OUT** to eliminate product abrasion, which results in undesirable release of free starch.

A lot number is assigned to each bin, and this may be used to correlate finished-product performance with raw material characteristics.

Individual lots are laboratory analyzed, classified, and stored according to sugar and potato solids content.

Physical and chemical properties of the potato vary greatly (probably more than any other vegetable). These characteristics are carefully controlled—especially reducing sugar content, which is held to a maximum of 2%.

At harvest time, reducing sugar is 0.6-0.8%. But under adverse storage conditions it may increase to 6-7%. However, proper time and temperature (usually 70 deg. F.) enable adequate control over this factor. Length of time and actual temperatures used in this "tempering" process are predetermined to meet scheduled production.

New Units Spur Line

A single preparation line serves all processes except the potato granule operation. Two lines combined, handle 1,000,000 lb. of raw material daily. Washed as they are conveyed by a flume to the peeler, potatoes move across a trimming-inspection belt, then go to size graders.

According to size, tubers are routed to the different processes by belt conveyors.

Potato Granules: For years, researchers have been improving the process used for this product, known commercially as instant mashed potatoes. It's comprised of tubers reduced to their simplest form—individual cells with moisture removed. In progressive successes, product quality was improved and the process perfected. Latest advances are development, about two years ago, of the add-back technique, the air-lift dryer, and the more recent fluidized bed-dryer.

In making this product, peeled, trimmed potatoes are spread on a wire-mesh belt and cooked as they are conveyed through an atmospheric, steam cooker. They are cooled by "steam off" to about 140 deg. F., during elevation by belt-conveyor to the mashing rolls.

Subsequent operations are designed to handle the product gently, avoiding mechanical damage to the fragile potato cells. Such injury results in the release of free starch which, in the reconstituted product, causes undesirable pastiness.

Clearance between rolls (about 0.05 in.), permits mashing the product without cell rupture. Heat imparted to the drums by hot product, partially dries mash, which is skimmed from the rolls by doctor knives. Product drops into the first of a series of three mixing operations.

It now contains approximately 76% moisture. Previously dried granules, or "seed", containing 12% moisture is added at the rate of 1½ times the weight of the mash, to reduce overall moisture content. At this point, 125 ppm. SO_2 (on a dry basis) is put in to inhibit product oxidation.

Mixture is further granulated in two subsequent operations, then is elevated to moisture-equalizing bins. When equilibrium is reached approximately 38% moisture), the mixture is conveyed to the air-lift dryer.

Product Floats On Air

This large, specially designed unit sits atop a propane-fired furnace. Dry 360-deg.-F. air is drawn from the furnace into the dryer. Moist air is exhausted through a rooftop duct. Gran-

War Baby Grows Up

The original Simplot plant began operation during World War II, producing dehydrated potato products for the military forces. As the war drew to a close, management recognized the need for diversifying production.

So, canning and freezing lines were added for fruit, vegetable, and berry items, and a number of new potato products were developed.

With the exception of some finishing operations, 14 potato products are prepared on only 3 major lines.

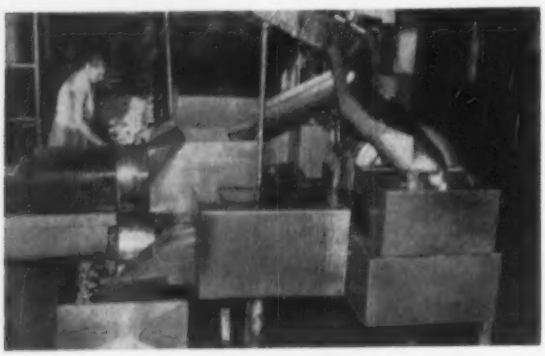
The following 4 frozen items are produced in a significant volume: French fries, patties, hash brown, and shredded for mashing. There is high output, too, of 2 dehydrated items—potato granules and a cubed product. And further, there are these 3 "regulars": Canned whole peeled potatoes, flour, and meal.

Also now being green-lighted by the company's marketing department are these additional 5: Frozen scalloped, scalloped with onions, au gratin, whole baked, and stuffed potatoes.

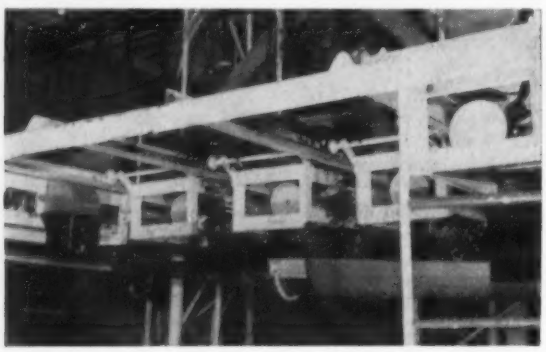
Closeups On the Lines

BLEMISHES are eliminated from potatoes on these efficient sanitary hand-trimming lines. Tubers are kept moist by a series of water sprays that prevent discoloration. Product then moves to size-graders.

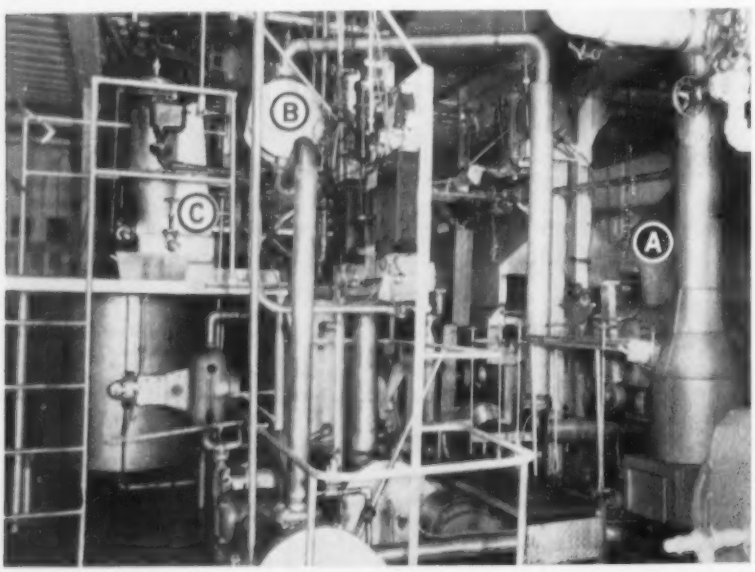
ADD-BACK material, from bone-dryer, is metered into mash in first ribbon-mixer.



HIGH-SPEED slicers cut potatoes into strips. Conveyor (rear) discharges onto strip shaker-grader, where short-cut pieces are removed and routed to dicers.



BATTERY of overhead machines dice potatoes and then discharge them into flume leading to hydro-conveyor. Note chutes that feed units from screw-elevator.



SYSTEM assures return of speck- and water-free oil to fryer. Pumped from fryer (A), oil goes through shell-tube heater (B) and centrifuge (C). Blower-vent (A) removes water-and-oil vapors from fryer.

ules ride on this air stream which, aided by a baffle system in the interior of the dryer, dries them until they are sufficiently light to pass over to the cyclone separator.

The granules, now dehydrated to about 12-14% moisture, are divided by a sifter into three fractions: (1) A coarse one, removed by a 14-mesh screen and packaged for stock feed; (2) add-back material taken from the flow by a 60-mesh screen; and (3) the portion that passes through the screen.

Add-back material (comprising about 80% of flow from air-lift dryer), is further dried to 12% moisture in a bone-dryer, then chuted to a feed-hopper above the first mixer.

Third portion (comprising about 15% of flow) is air conveyed to another bone-dryer, where its moisture is reduced from 12-14% to a uniform 12%. A second, smaller, bone-dryer reduces this moisture to 10% and granules are chuted to the fluidized bed-dryer.

In the bone dryers, hot air enters through a jet and the granules dry as they are swept upward through the main riser. At the top of the drying column, air velocity is reduced by means of an inverted truncated cone, attached to the top of the riser.

Larger particles remain in the riser until dry enough to be carried over the top, whereas smaller particles are dried sooner and pass out of the column without appreciable delay.

This drying system is designed to eliminate shattering, abrasion, and scorching of the fragile cells. Bone-dryers are relatively new, having been installed here about two years ago.

Porous Floor, Gentle Drying

The fluidized bed-dryer, installed this season, is comprised of two sections, and further divided horizontally by a porous carborundum floor.

Air, heated by a steam radiator, is pumped into the plenum chamber, under this floor, and maintains a static pressure of about 3½-4 in. of water. Temperature of input air is 250 F. This air, after passing through carborundum and the product bed (about 4-4½ in. deep) is reduced to 140-145 F. just above the granules.

Product enters at 125 F., and exits at approximately 135. The smaller, cooling section utilizes 70 F. air and a coil of copper pipe, located just above the carborundum floor. This cool water circulator aids in heat transfer.

Finished product chutes from this cooling section to the bagging station at 85 F., and 6-6.5% moisture. However, moistures as low as 3% can be attained with this system. The bagged product is stored in an air conditioned room until it is finally filled and hermetically sealed in cans of various sizes.

French Fries: Of all frozen potato products, French fried strips are produced in greatest volume. Like more recently developed items, this one had an unauspicious start. But during the last three seasons, demand has significantly increased. Total U.S. production (1953) was over 60,000,000 lb. In 1954, production here was 8,000,000 lb. and, this year, it will probably be twice this amount.

This increased acceptance was not solely due to an "awakening" on the part of users and consumers to the availability of this product. Instead, it was largely the result of improved quality of the product.

"Here at Simplot's", says Leon Jones, "we redesigned the heart of the French fried line to improve product quality and keep abreast of increasing demand. This heart of the line is the tandem-type fryer. Along with the dryer preceding it and the defatter and cooler following it, it was designed by and constructed for us."

FOR A REVEALING overall view of the advanced multi-product lines, just turn to the 4-page foldout flowsheet on pages 118-121.

A reservoir supply hopper serves the line with raw material. Submerged in water, to eliminate oxidative color changes, potatoes are moved from an opening, at the bottom apex of this hopper, by a screw conveyor. Although water is continually changed, none is removed by the conveyor, which has its discharge located higher than the hopper water level.

Chuted from the conveyor to high-speed slicers, potatoes are sliced into strips, then conveyed to a shaker-grader. Here all slivers and small slices are removed and hydro-conveyed to dicing machines. Strips are discharged to a conveyor leading to blanchers that utilize condensate from the tubular heat-exchangers used for heating the fryer oil. Strips are blanched at 205 F., dewatered on a vibrating screen, then conveyed to the strip dryer.

This enclosed unit consists of a series of three staggered, stainless mesh belts. Three fans blow air (20,000 cfm.) through steam radiators and then, at 230 F., through the strips. Dewatered strips enter on the top belt, cascade down upon the other two, and are then conveyed to the fryer.

Efficient Fryer Design

Experience in the techniques of processing French fries led to the recent development of this intricately controlled, tandem type, stainless steel fryer. Oil temperature is controlled automatically by recording instruments.

The systems were designed to contain a minimum of hydrogenated shortening. Two-stage, tandem frying provides flexibility in processing, divides heat input load, and makes possible maintenance of uniform temperatures at necessary ranges to insure a quality finished product.

Temperatures, in either fryer, may be varied to account for differences in raw material. Flow rates can also be varied by adjusting speed of oscillating screens that move the product through the units.

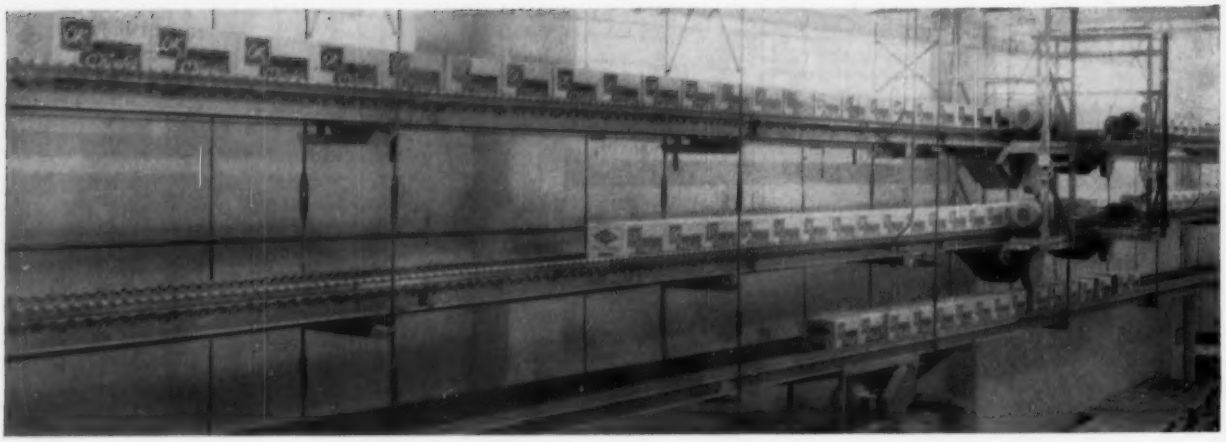
Hot oil, supplied to each fryer by its individual tube-shell heat exchanger, is constantly circulated through a trap, then is pumped to the heat exchanger and returns to the fryer. At regular intervals a centrifuge is cut-in to remove specks or impurities. A screen in the trap takes out large particles or fragments of potatoes.

This system is specifically designed to protect the liquefied shortening from degradation due to the heating-cooking cycle. It is maintained essentially in its fresh state, always free from undesirable flavors. A forced-draft, side-exhaust system, removes water vapor and vaporized oil, and eliminates polymerization and free fatty acids.

Cooked strips emerge from the sec-

(Turn to page 212)

STRIKING LINEUP displays multi-production and variety of Simplot's operation. It all stemmed from an original single item, company having been sired by military need for dehydrated potatoes in World War II.



FILLED CARTONS move on three live-and-gravity roller conveyors to →

Their Mechanical Equipment "*Handles All the Handling*"

Product is put up at O'Keefe's the "machine way"—from empties-in to fulls-out . . . Star role in this system is played by automatic palletizer

JAMES MONTAGNES
Special Correspondent, Toronto, Canada

No human hand touches the bottles of beer at O'Keefe's Brewing Co., Toronto.

From the moment the empties arrive until the fulls are trucked out to the retail stores, automatic and mechanical equipment takes care of the handling.

The unit rounding out this mechanization at O'Keefe's is the new automatic palletizer. This machine teams up directly with the brewery's earlier automatic filling and labeling operations.

Here is the operating sequence: Cases of empty bottles which are returned to the plant by truck and received at ten covered loading bays are sorted, then sent by underground conveyor to the washer, where they are cleaned for re-use.

Each of the ten shipping bays is equipped with an electrically-operated tilting ramp, with capacity of 10,000 lb. So any difference in vehicle height is thus instantly compensated for fastest, fool-proof loading and unloading.

Three separate conveyors from the brewery enter the main storage room, which is 250 by 100 ft., with 22-ft.-high ceiling. The switching facilities are located on a bridge between the storage building and the adjoining brewery and bottling plant. They enable the distribution operator to control flow on the conveyors, as required by demand.

Hinged belts give necessary flexibility so that packages coming from one bottling line can be routed either for mechanical piling or hand piling.

The three conveyors deliver filled cases to the new unit—the Palletier—an automatic palletizer developed by Mathews Conveyor Co., Ltd. Port Hope, Ontario. This machine will handle either 12- or 24-bottle cartons, counting them by electric eye. And it automatically changes position of the cases—pallet-patterning them so that no case in the stack ever bears its whole weight on another below but instead has its load distributed.

Palletizer in Action

Wooden pallets are supplied to, and retained in, the palletizer's magazine, from which they are automatically elevated one at a time to the top of the machine. Here a layer of ten cartons, each holding 2 doz. pints, is built up on a steel loading plate which extends out over the pallet.

When the plate is withdrawn, the cartons are deposited on the surface of the pallet, which is then lowered the equivalent in height of one layer of cases. Then another layer is built up on the plate and subsequently deposited on top of the former layer.

The alternating of the pattern to interlock each layer is accomplished by steel fingers, strong springs on guide rails, and an electric-eye counter that checks off the cases, then operates the steel fingers.

The loaded pallet is discharged to a roller conveyor, from which it is picked up by a fork-truck for transportation to the storage area or to a waiting truck.

To load a pallet with 60 of the 2-doz. cartons, or twice as many 1-doz. cartons, requires approximately 2 min.

In addition to loading pallets, the machine also controls flow of cartons coming to it along the conveyor lines. It "responds" only when full pallet loads are accumulated on the conveyor belt. This makes it possible to draw two pallet loads from one line, while only taking one from the other. And an operator's attention isn't required, since transfer from the feed conveyors to the loading conveyor is automatic.

ROBOT PALLETIZER →

where they go in at top via feed belt (A-A), to be formed into patterned layers (B) on pallet (C). Loaded pallet comes out (D) to be taken by fork-truck to shipping dock or warehouse.

To achieve this automatic conveyor operation, a combination live-and-gravity roller system was installed.

A straight-gravity conveyor is not satisfactory, since it allows cartons to gain too much speed and to travel in trains before jolting to a stop at the end of the run. Gravity, too, would not provide the quick acceleration needed to have the cartons flow quickly to the palletizer.

Conversely, a live roller conveyor would provide the necessary acceleration, but would build up excessive pressures on the cartons when accumulated for approximately 125 ft.

Therefore, a unit was built to combine the acceleration principles of live rollers with roll accumulation pressures of gravity conveyors.

Storage conveyors are given a slight slope—about $\frac{3}{8}$ in. per linear foot after the fashion of the gravity conveyor, with live rollers provided at 24-in. installations. And slight drive pressures are maintained by making the unit a live-roller conveyor, with driven rollers located at 18-in. centers.

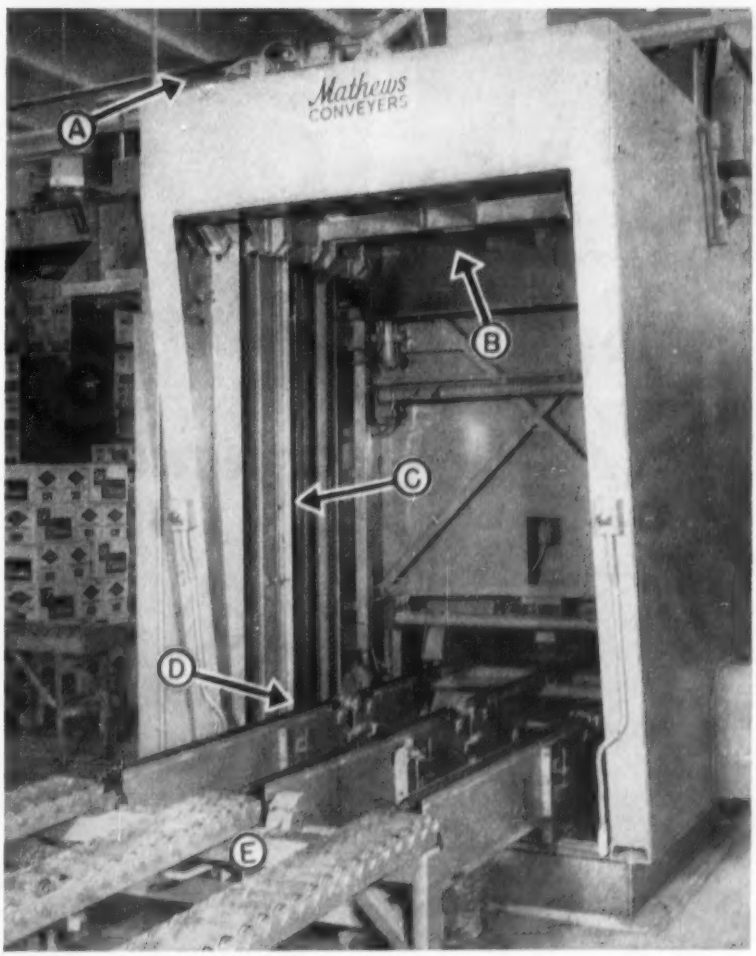
As an added precaution, metering belts are used to split storage conveyors into two distinct units to further reduce accumulation pressures.

Results have actually exceeded expectations, for no cartons have been damaged since this installation.

Training of Operators

To insure maximum efficiency in this mechanical operation, special training courses have been held for

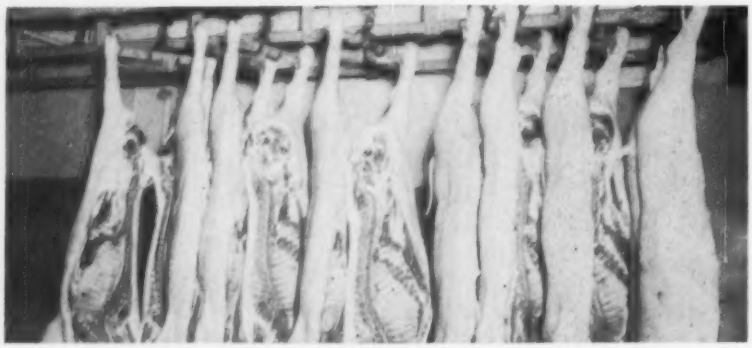
(Turn to page 195)



CLOSEUP of Palletier. In top (A), patterning of cartons into layers is carried out on a steel plate. This is then retracted to drop layers on pallet, which has been moved onto carriage (B) from rear of unit. As additional layers go on, carriage is lowered by chain elevator (C). Finally, chain conveyor (D) ejects loaded pallet onto roller conveyor (E).

1-2-3 of a Graphic *Snapshot-Checkup*

1 CLICK! And Author Thompson has direct "photo-eye evidence" in Reliable's chill-room—his Leica producing . . .



2 . . . THIS FILM, revealing carcasses badly spaced—some jammed together —so meat can't properly chill. Then superintendent sees that . . .

3 CORRECTION COMES FAST, as disclosed in this follow-up film. Here, foreman is seen pinpointing factors of hanging that speed cooling, up quality.

Uses Camera as Tool To Aid Management

Snapshots of conditions in plant play prime role in ★ Boosting worker morale and operating efficiency . . . ★ Bettering sanitation . . . ★ Stemming accidents . . . ★ Spurring suggestions and . . . ★ Sharpening maintenance

JOHN E. THOMPSON
President, Reliable Packing Co., Chicago

At Reliable Packing Co. we have dropped the time-consuming and not-too-effective practice of writing inter-departmental memos and reports on the good and bad conditions we spot in our plant during inspections.

Snapping pictures is the new idea we've adopted to give graphic accent to such situations. And it's proved so simple—and so much more potent in impact on personnel—that today we reach for a camera instead of a typewriter.

What we focus on are those plant conditions that depict ideal or faulty . . .

–Safety situations
–Housekeeping conditions
–Processing techniques and
–Maintenance methods

(Turn to page 213)

Photography Is a Snap

Anyone can readily equip himself to take plant pictures suitable for management purposes.

Modern cameras and film make the job easy and practically foolproof—they even make it fun.

With a fast lens and the new high-speed film, properly exposed photos can be obtained under ordinary factory lighting levels. But you must, of course, use an exposure meter. And some of the newer cameras have built-in meters and integrated speed and aperture setting devices that make photography really simple.

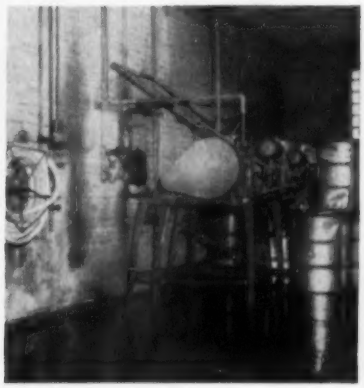
With flash bulbs, plant pictures can be taken with almost any kind of equipment—even a box camera if it has flash synchronization built into the shutter. And with flash you don't need an exposure meter. You just divide a film-speed index number by distance to subject in feet and get your correct shutter opening.

So don't let fear of photography deter you from using a camera as a management tool. Any good camera supply shop can tell you what equipment you need and how to operate it.

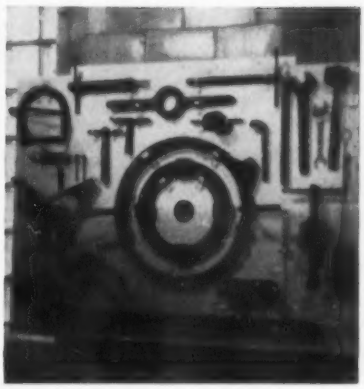
If you don't need sharp detail in the pictures, inexpensive equipment is O.K. If you do want top-quality photos, then a more costly precision camera is the ticket—*The Editors*

How Films Promote Housekeeping, Maintenance, Safety

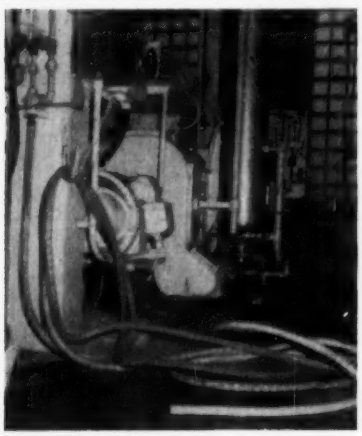
MORALE-BUILDING pat-on-back was reward for casing department foreman when he saw this photo of his neatly cleaned and practically arranged room.



ORDERLINESS of cooper shop is revealed by shot showing safe storage of hose, gleaming machines, well-washed floor, and absence of scattered tools.

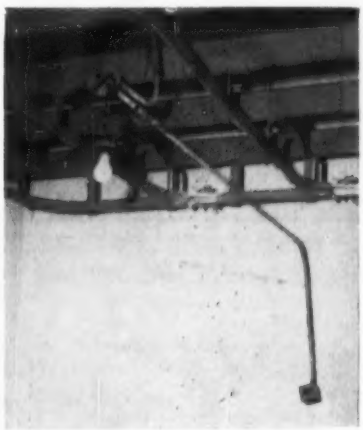


MAINTENANCE of machines is simplified by orderly, accessible arrangement of tools on board—as shown by film. Tools are for lard-rendering system.

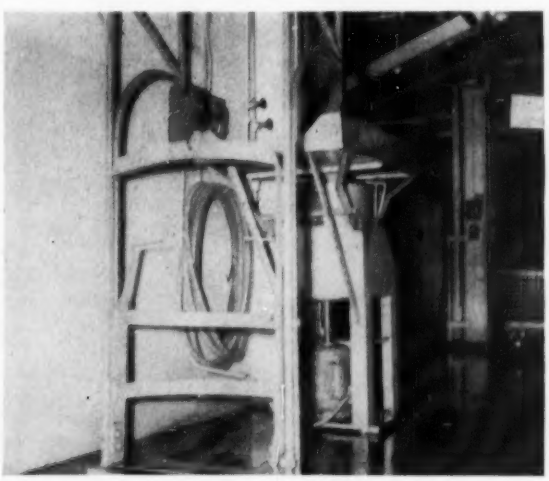


SAFETY HAZARD is pinpointed in this photo of improperly stored wash-down hose. Hose rack was later raised higher to improve condition.

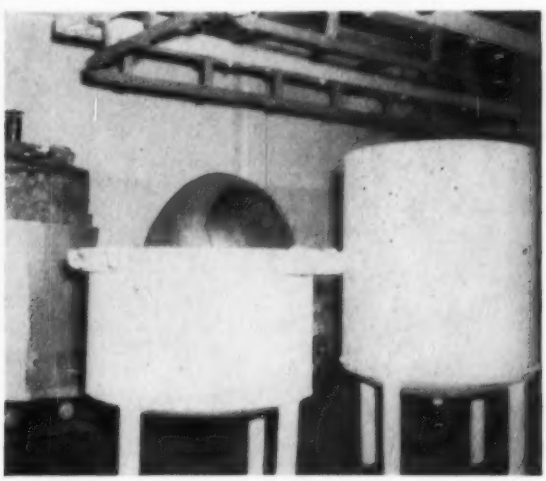
POOR housekeeping is in focus at this rendering-room bench. Wiping rags were immediately removed as potential fire hazard.



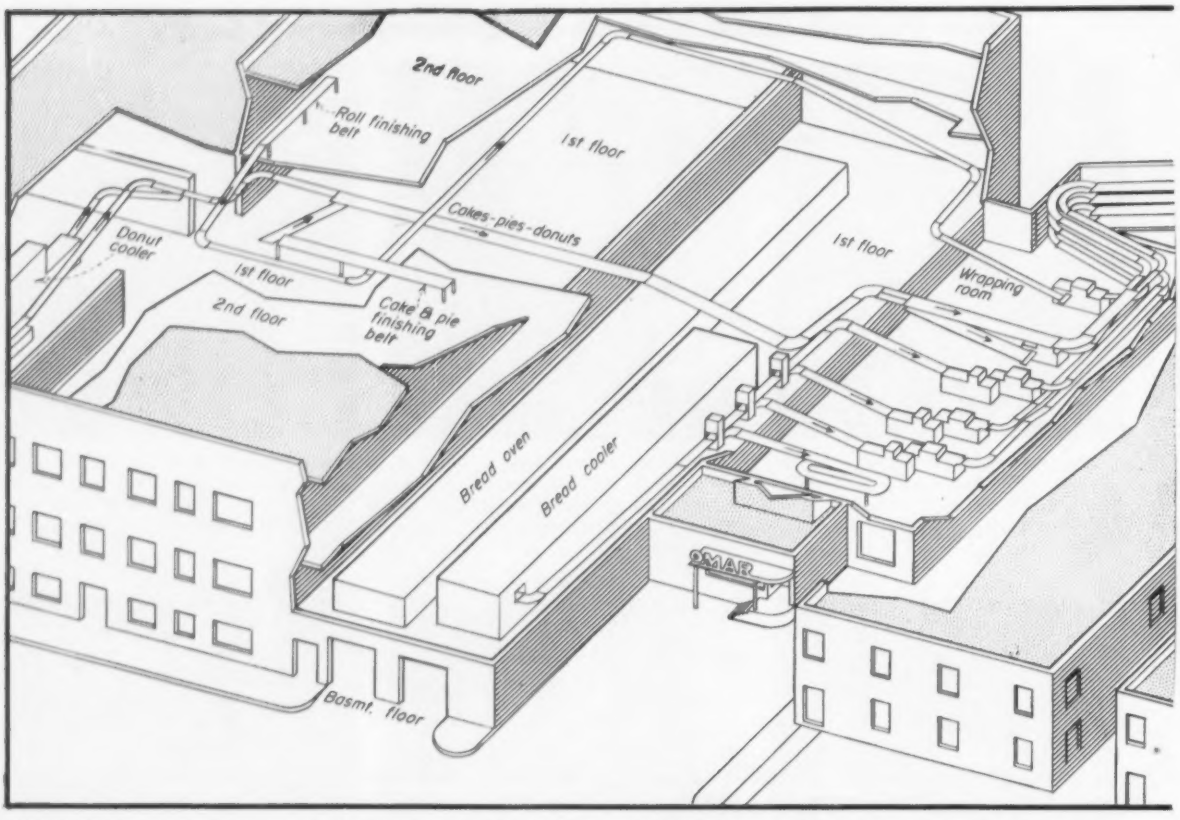
ANOTHER hazard caught on film—a fallen light fixture. It was quickly fixed and put back in place. There were ceiling repairs, too.



PRACTICAL temporary use of this bucket hoist (to feed pork fat into Titan lard-rendering system) followed the clicking of a strategic film.



"WHEN are these units going to be installed?" was question on this photo. Soon after, the two kettles, chill tank, and revolving pan were in place.



INGENIOUS use of conveyors enables Omar to whisk baked goods from bakery via bridge to new shipping center. New handling facilities permitted this enterprising bakery to modernize operations in outmoded plant.

Bridges Way to Expansion

Hemmed-in Omar bakery breaks shackles to expansion and modernization. Trick turned by conveyor bridge to shipping center, plus bulk-flour shuttle to plant. And advanced plant equipment steps up efficiency 33⅓%

JOHN V. ZIEMBA
Associate Editor, "Food Engineering"

How can you expand a plant that is hemmed in on all sides by streets and other property? That was the problem faced by Omar, Inc.'s Milwaukee bakery.

But Omar engineers smartly figured out a way. They went on a modernization spree—adding advanced materials handling systems and high-speed in-line equipment within the existing building shell. And thereby they saved in capital expenditure.

You can see this in a significant three-round efficiency-promoting redevelopment involving:

1. **Unsnarling the shipping problem by incorporating an ultra-modern finished-goods handling system. Big bottleneck, according to district manager R. H. Hoffman, was in the over-expanded, congested shipping operations. Here, jam-packel into a 40x68-ft. area were four wrapping machines and 17 men loading 10 trailers with freshly baked goods on a 4-carrier loading dock.**

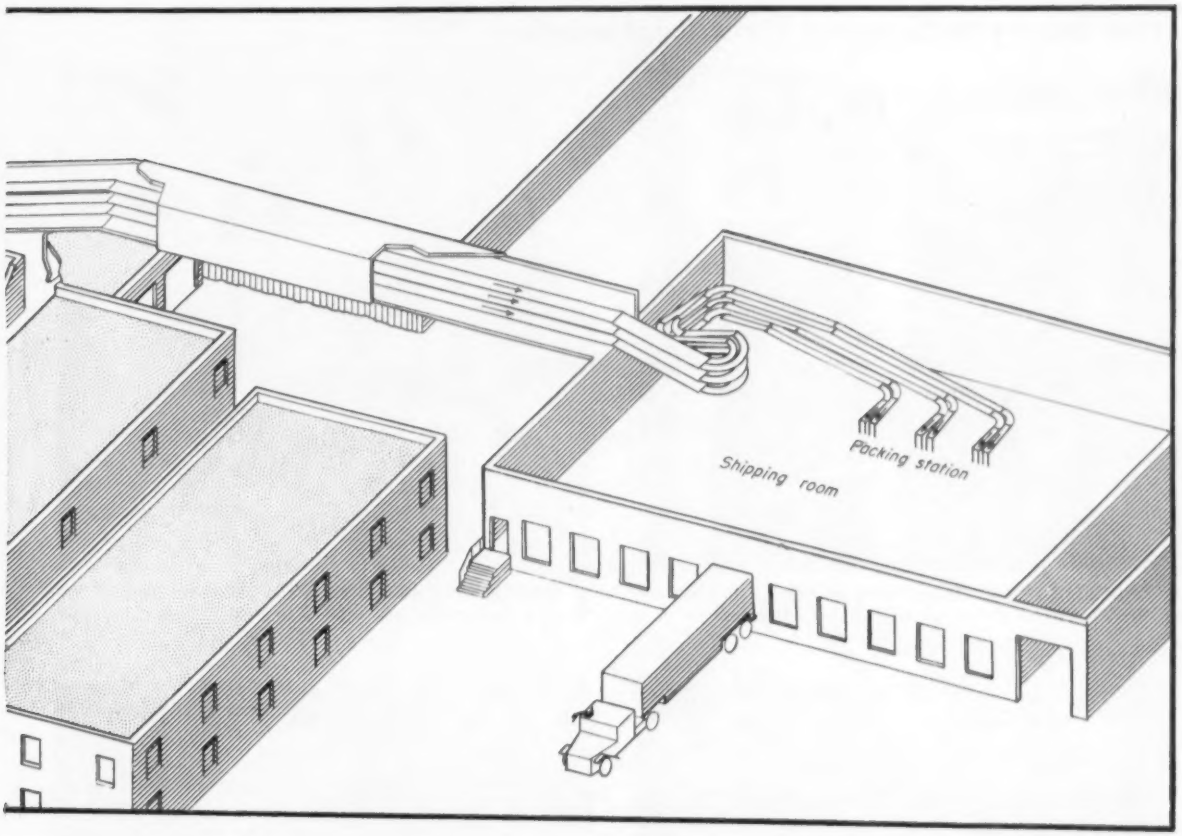
2. **Increasing, by 33⅓%, output of bread by completing a spanking new 90-loaves-per-min. line.**

3. **Alleviating the other half of the materials handling problem—flour handling—by installing a fully automatic pneumatic system.**

As Omar plunged into the first round of redevelopment, the startling fact was that it "bridged" the movement of wrapped goods a distance of 156 ft. over two adjacent factory properties to a new 67x126½-ft shipping building. And new handling facilities were installed by project engineer William M. Brown, to keep pace with the production setup achieved through the installation of advanced equipment.

This re-engineered finished-goods handling and shipping system has not only resulted in man-hour savings and abolished overcrowded working conditions, it also:

► **Streamlined handling and shipping**



from four production lines — bread, cake and pie, doughnut, and roll.

▶ **Provided sufficient space for the installation of an advanced bread line to step up output an additional 33⅓%.**

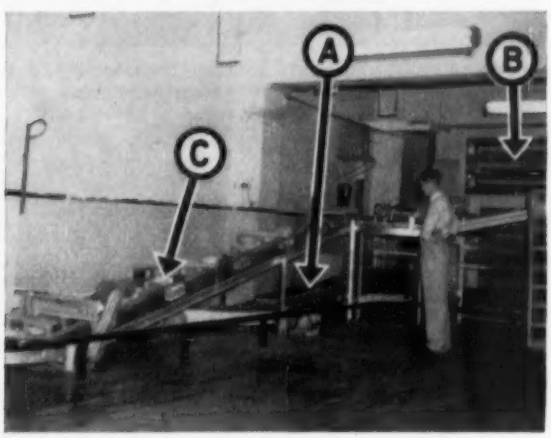
▶ **Enabled the company to operate its Milwaukee plant on a less costly basis, and to discontinue operations formerly carried out in Peoria bakery.**

▶ **Simplified the task of scheduling shipments to distributing warehouses.**

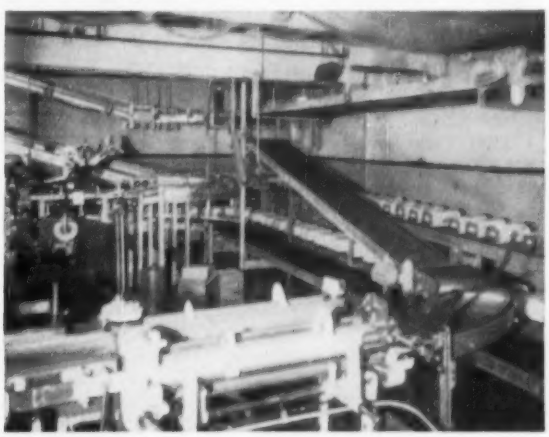
Before top management settled upon its presently modernized finished-goods handling facilities, considerable manual movement of goods to the wrapping-shipping area was involved. For instance, breads were transported 20 ft. from cooler racks to wrapping machines, while carton-packed doughnuts had to be hauled about 200 ft. to the shipping area. Cakes and pies were moved 60 ft.

All but doughnuts were hand-fed to wrapping machines. Packaged items were then packed into shipping boxes to be dollied about 40 ft. to the loading dock.

Speedily Conveyed From Bakery to New Shipping Plant



1 IN BAKERY: Trayloads of bread (A), are "tier-selected" from cooler (B) for wrappers. Carton-packed doughnuts (C) are conveyed to wrapping machine.



2 IN WRAPPING department: Wrapped baked goods converge from five machines and onto three 30-in. Wendway conveyor belts. Room is now less congested.

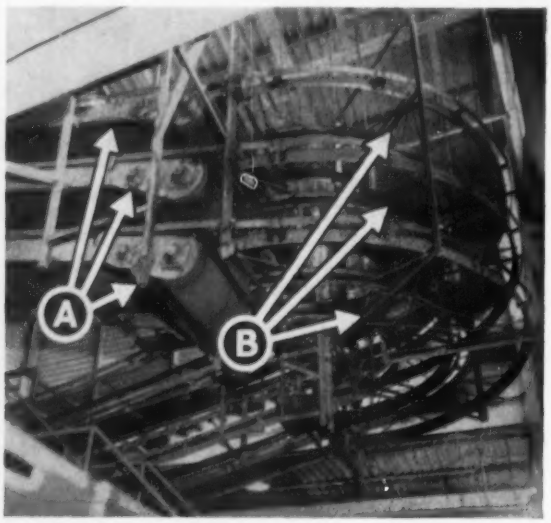
Pictures continued on Next Page ⟶

From Bakery to Shipping Plant (continued)

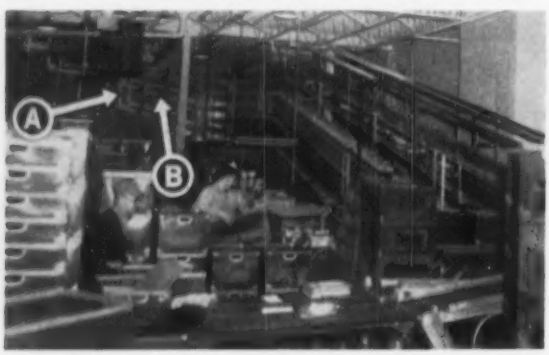
3 **INSIDE BRIDGE:** Three belts (30 in.), each with a double row of goods, go to new shipping center.

4 **BRIDGE BY-PASSES** packaged baked goods past factory (not company owned) to new shipping building.

5 **IN SHIPPING ROOM:** Triple-tiered conveyors make 90- and 180-deg. turns to drop goods to packers.

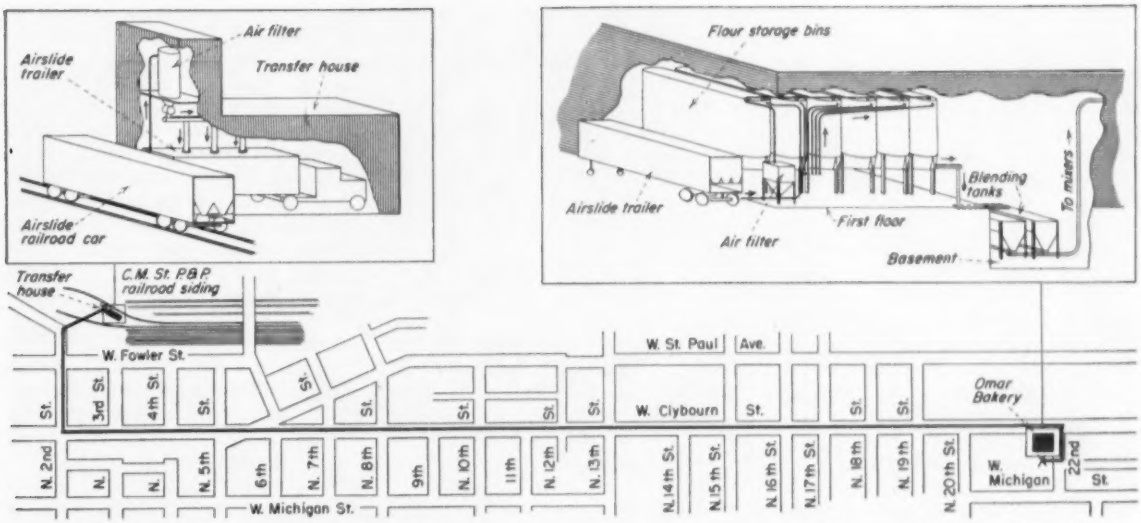


6 **RUBBER BELTS** (A) from bridge transfer goods onto Wendways (B) that lower them into shipping room.



7 **IN** shipping room, three belts (A) of goods split into six (B). Tray-packed items are dollied to dock.

8 **NEW TRAILERS** are backed up to shipping center dock for loading.



PACE-SETTING BULK HANDLING SYSTEM: Flour is now shipped from mills in 95,000-lb. capacity Airslide railroad cars to downtown Milwaukee R. R. siding. Here, in transfer house, flour is loaded into specially built Airslide trailer. The 40,000-lb. load is then hauled 1½ miles across town to be pneumatically unloaded into bakery.

For a sharp picture of flow of products, let's follow each line to the wrapping department and then to the new shipping area:

Each cooler's tray-load of 20 loaves is now conveyed a maximum of 80 ft. to a Read Standard tier selector. This electrically-controlled, pneumatically-actuated unit alternately feeds each loaf-group of bread into four AMF slicing-wrapping machines. Operation of the selector is controlled from an electrical "brain" panel in the wrapping department. And through manual selection of in-and-out switches on this panel, flexibility has been engineered into the four slicing-wrapping machines. Loaves are automatically fed to these units either singly or in any combination of two or three. Too, overflow of loaves is conveyed to a sorting table.

Carried to the wrapping department on 12-in. wide wire-rod conveyors, rolls travel a distance of 250 ft., doughnuts for 240 ft., and cakes and pies 150 ft. Rolls and sweet goods are conveyed to a wrapping machine, while cakes and pies either by-pass or continue to still another wrapper.

And with the installation of an additional wrapping machine, there is much less congestion in the wrapping department.

Leaving the wrapping machines, packaged goods are conveyed to triple-tiered, 30-in. wide wire-rod belts with 90 and 180 deg. turns that elevate them 14 ft. to the enclosed bridge. Bottom conveyor carries two rows of wrapped bread. Tiered 2 ft. above this belt is another for one row of bread, and another row for cakes or pies. And tiered above this belt is still another for doughnuts and rolls.

From the circular-type elevator conveyors, products are then automatically discharged onto 30-in. wide belts. These triple-tiered rubber belts carry the six rows of goods 156 ft. to the new shipping building.

Here, items are transferred to a second set of triple-tiered circular-type conveyors that then lower them 14 ft. into the shipping department. Products are then discharged onto six 18-in. belts going to the packing lines. At this point, ten packers load the baked goods into shipping boxes for a 40-ft. transfer to the new 10-carrier loading dock.

Outside bridge to the shipping building is 8x8½x156 ft., and it is 14 ft. off the ground at the maximum point. It is built of structural steel, with concrete floor, standard-type roof, and corrugated Transite sides.

Formerly, the Milwaukee bakery supplied 10 distributing warehouses for its 315 delivery routes, while the Peoria plant handled 55 routes out of two warehouses. Now, taking over the Peoria bakery, Milwaukee supplies 370 routes out of 12 warehouses.

Brand New Bread Line

Another pet project of the whole redevelopment scheme is the new bread line—round two on the planning program.

As stated, output on the new Read standard line has been "upped" about 33⅓%. Installed was a six-pocket dough divider and proofer, two advanced molder-paners, and a 32-rack proof box.

Panned, proofed dough then goes into a new gas-fired, temperature-controlled and -recorded, four-zone oven (10⅔ x 110 ft.). Entire oven finish is of white vitreous enamel, with stainless steel trim strips. Oven is wide enough to hold 20 loaves (1½ lb.). Baking takes 22 min. Capacity of the oven is 5,500 loaves per hr.

Outstanding about the new oven is the Thermoflow heating system. Hot air is directed against bottom and sides of bread pans, jacketing each pan with circulating heat. This hot air is drawn through the completely vented oven ceiling, returning through vents in the bottom of the unit, and then recirculating upward throughout the entire baking chamber.

As a result, there is no need of flash pans at start up of the baking operation. Moreover, breads are rapidly baked to uniformily golden brown loaves.

Leaving this variable-speed oven, loaves are automatically depanned for conveyor travel to a floor-mounted, 10-tier, 355-tray (20 loaves to a tray) cooler. Here, an automatic loading device—a chain-driven pusher bar—feeds 20 loaves of bread onto a cooler tray that comes up into position to receive them.

Cooler is 9x13½x81 ft. and, based on a 75-min. cooling time, its capacity is 5,500 loaves hourly. Trays are constructed of special stainless steel grills. Built into the bottom of the cooler leg is an automatic tray washer.

Flour Handling Shuttle

And looking at the just-completed bulk flour-handling system, the difference between Omar's first two and the third round of redevelopment is even more striking.

Omar engineers really pulled a rab-

bit out of the hat when they equipped this bakery with bulk flour handling.

Some wagged their heads and said it couldn't be done. Reasons were the bakery was 1½ miles from a railroad siding, and it didn't look as if room could be squeezed out of the building for additional storage bins.

But here's how this third round was really tackled:

Movement of flour, in bulk, is now achieved with a 40,000-lb. capacity Airslide trailer. Moreover, this over-the-road "mover" reduced the need of excessively large storage bins in the bakery because of precise timing of mill-shipped flour and trailer delivery from railroad hopper car to bakery. Also curtailing large bin requirements are the temporary "silos"—two 95,000-lb. capacity, enamel-lined, Milwaukee R.R. Airslide covered-hopper cars that can be spotted alongside the downtown unloading house.

Installed in a 43x60 ft. room formerly used to wash racks, pans, etc., are two 80,000-lb. and four 110,000-lb. horizontal metal bins. First floor has been raised to accommodate these flour bins.

The 33-ft. Airslide trailer is a self-contained unit for unloading flour from railroad hopper cars and then loading it into the six new bakery storage bins. Loading or unloading of a 40,000-lb. trailer load of flour takes only about 1 hr.

Here's how flour is unloaded from railroad hopper and into the bulk trailer:

The trailer is backed into the 16x54x40-ft. unloading house, which is constructed of structural steel with corrugated Transite sidings. Direct loading of the trailer is accomplished by Airslide action and Fuller air conveying. This system is pushbutton operated from a panel on the trailer.

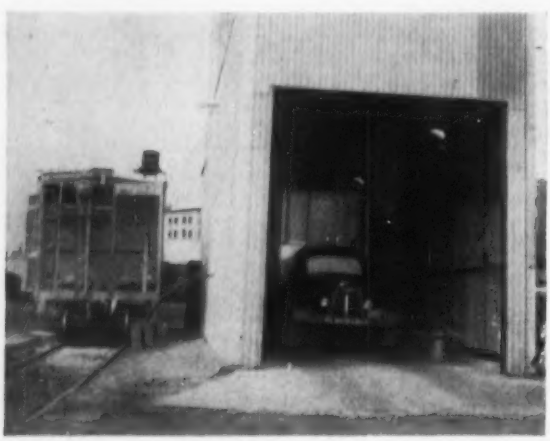
Flour is fluidized by the Airslide action to prevent it from adhering to the sides of the railroad hopper. Fluidizing is achieved by low-pressure air (¾-1 psi.) that enters the bottom of the car through ducts. Two trailer-installed Roots-Connersville type blowers, driven by V-belts from a common motor, supply air to the hopper car's Airslide—and to the trailer's Airslide during unloading.

Flour now drops into a horizontal air in-take tube at the bottom of the car. Trailer's motor-driven exhausters create a partial vacuum in the 30-ft. pipeline to the dust collector inside the car-loading house to produce the air velocity needed to draw air and flour into the system. The flour then "air extrudes" through a rotary air-lock feeder for discharge into an 18-ft. worm-screw conveyor that empties into three 1-ft. dia. ports feeding the trailer.

To prevent pressure build up in the dust collector, that unit is equipped with an air snubber.

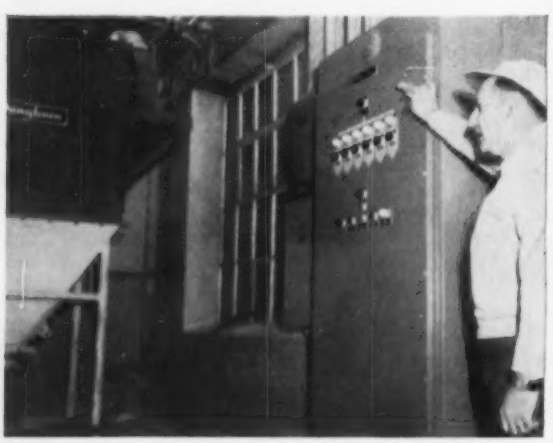
The trailer-load of flour is now hauled about 1½ miles to the bakery.

(*Turn to page* 168)

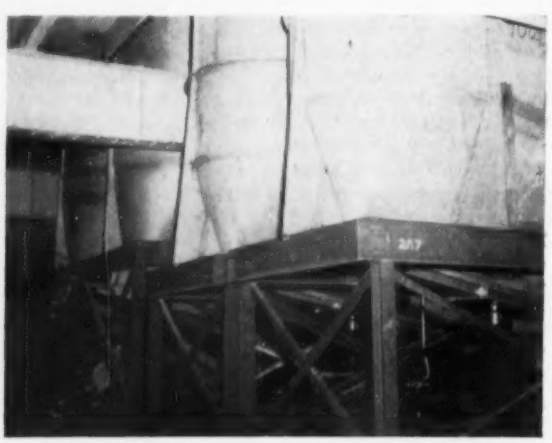


LOADING trailer: Inside transfer house, huge trailer is loaded with flour from hopper car in about 1 hr. by Airslide action and penumatic handling system.

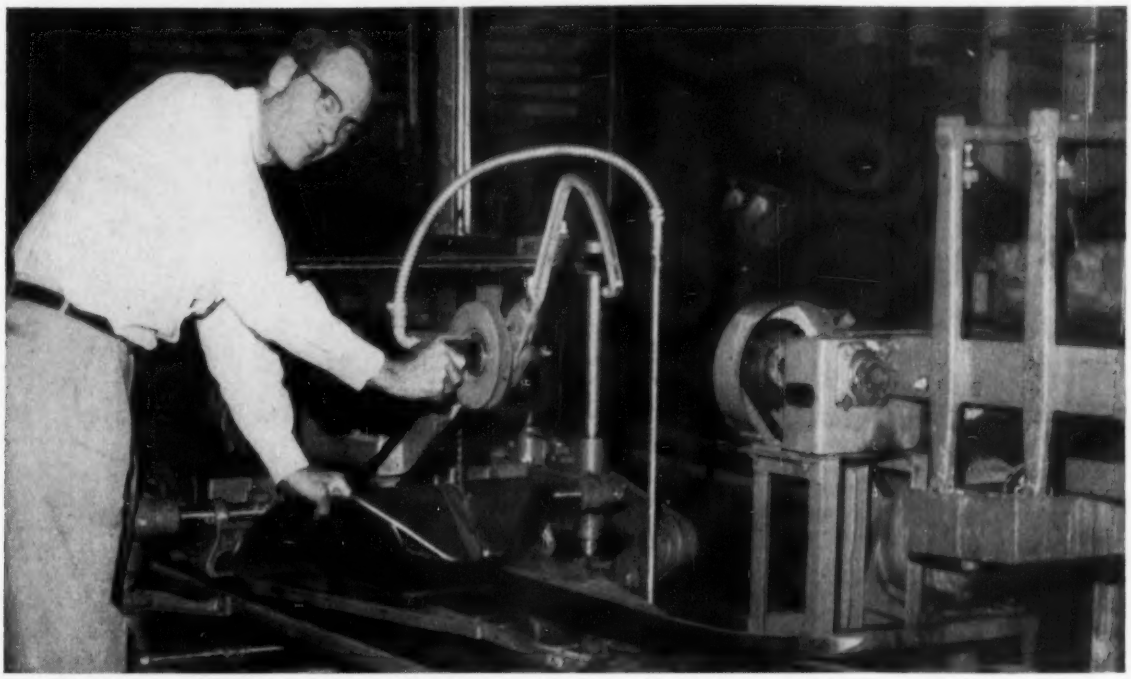
UNLOADING trailer: At bakery flour is air conveyed into six storage bins, with a total capacity of 600,000 lb. Unloading also takes 1 hr.



PNEUMATIC filling of storage bins is controlled from panel (right). Signal lights on board indicate if system is ready for unloading and if bins are full.



CEILING was raised from this portion of the first floor of bakery to permit installation of six Airslide flour-storage bins.



EVEN the carton sealer gets attention of Supervisor Dunn in program of QC-ing the canned beverages.

QC STRESSED
In New Canning Plant

¶ Sealed syrup preparation . . . ¶ All-out water treatment . . . ¶ Dual CO_2 can-purge . . . ¶ Extensive testing . . . ¶ And "ray" checks—are teamed for precise quality control of White Rock drinks

ROBERT A. LATIMER
Special Correspondent, Denver, Colo.

It's evident that the major stumbling block to progress of canned carbonated beverages has been customer dissatisfaction with flavor of the product.

Hence, management of Denver's new White Rock Canning Co.—which opened the city's first beverage canning line last August—has put maximum emphasis on quality control.

This control has been carried well beyond the standard testing of each production batch by the parent company's Brooklyn laboratories, and the Brix formula test at the syruper.

Additional QC facilities include a "super sanitary" syrup processing room that can be washed clean with 180-deg.-F. water and a spray hose. Also, there's an exacting water treatment.

In a corner of the production area is found the focal point of preliminary quality control—the syrup room, measuring 16x32 ft. Here, inroads of water are curbed completely through use of waterproof cement, six coats of heavy, waterproof white enamel, special casement windows that can't be damaged by hot water, and custom-built, tightly-sealed processing and storage tanks.

Located at opposite ends of this room are two pairs of 1,000-gal. stainless steel tanks, fabricated to White Rock's specifications. Two of these tanks contain eight 2-in. x 5 ft. steam coils, used for cooking batches of syrup with steam, furnished by the 65 hp. boiler on the opposite side of the front wall.

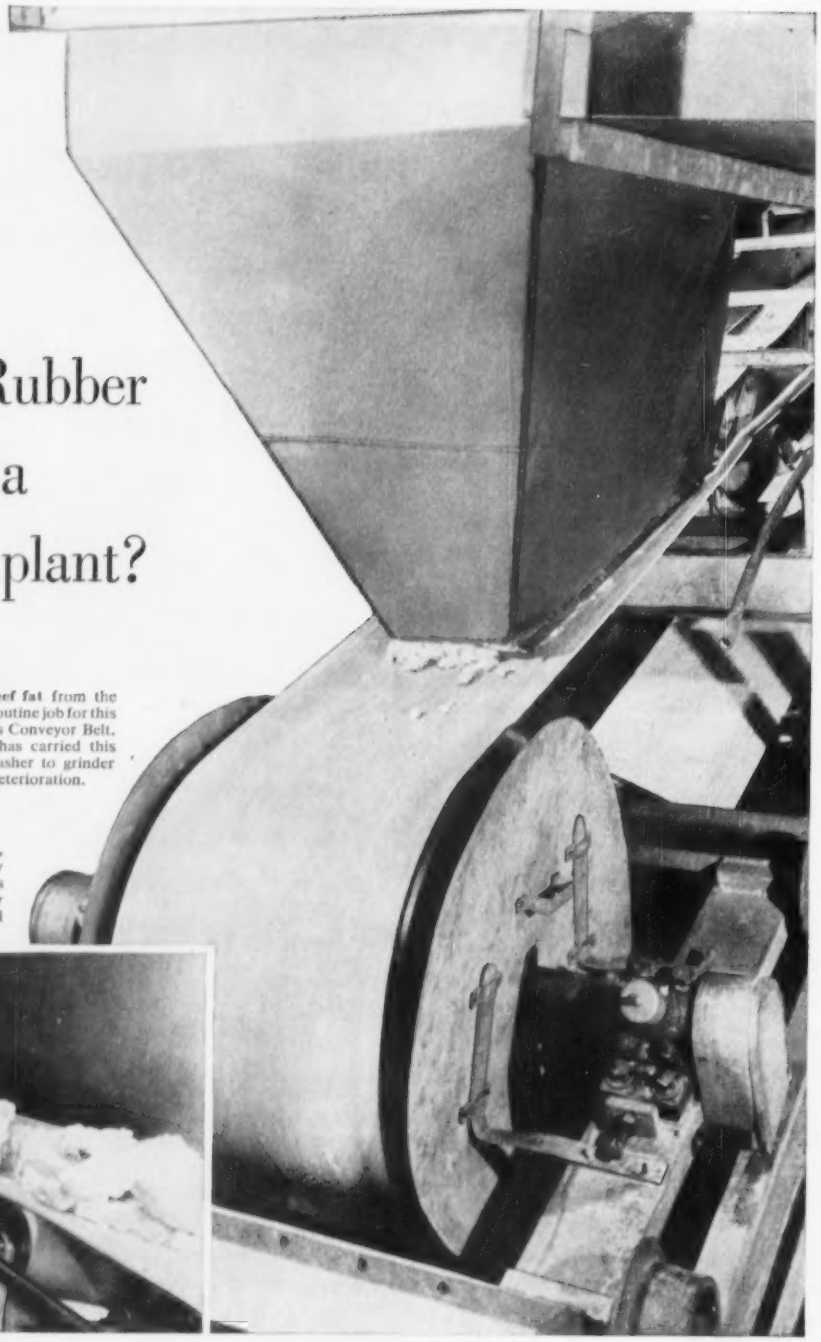
After 20 min. of heat processing, the syrup is pumped through a Walker-Wallace plate unit, where it is cooled with city water, then to the two similarly sized storage tanks.

Contrary to the usual open-top design, these tanks are completely closed, except for the 14 in. rubber-gasketed lid, which clamps tightly in place. Resembling inverted saucers, the stainless steel lids are provided with 1-in. vents, into which a 3-in. cylinder of cotton wool is tightly packed, providing pressure ventilation, but nevertheless waterproof.

It is through this complete protection of the product that it is possible to hose down the entire room once or twice daily, depending upon the need, in the routine of keeping it immaculate.

From storage tanks, the syrup

What's U. S. Rubber doing in a meat packing plant?



Taking stripped beef fat from the hopper above is a routine job for this U. S. Meat Packers Conveyor Belt. For 1½ years it has carried this edible fat from washer to grinder without sign of deterioration.

Section of 400-foot U. S. Meat Packers Belt, shown on way to discharge point, is especially designed to withstand destructive action of fats and 180-degree hot water baths. It's extremely sanitary, odorless, non-toxic, washes easily and imparts no flavor to product conveyed.

Doing the job better than before is the axiom of U. S. Rubber belting engineers. Here they studied every operating condition before developing the belt illustrated. It replaced a metal belt which required considerable upkeep and was dangerous to the workers. These same engineers can do a similar job for you, whatever the installation. Next time you need conveyor belts, contact them at the address below.

"U. S." Research perfects it. *"U. S." Production builds it.* *U. S. Industry depends on it.*

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Hose • Belting • Expansion Joints • Rubber-to-metal Products • Oil Field Specialties • Plastic Pipe and Fittings • Grinding Wheels • Packings • Tapes Molded and Extruded Rubber and Plastic Products • Protective Linings and Coatings • Conductive Rubber • Adhesives • Roll Coverings • Mats and Matting

passes through two thicknesses of fiber-paper filters, before going to the syrup cooler, a Freon refrigerating unit, that brings its temperature down to 55 deg. Stainless steel lines are used in moving syrup to the syruper.

This sealing of all syrup production from atmospheric, or moisture attack, is duplicated in the treatment of city water, which likewise bears a powerful influence on the quality of the finished product.

The water is first passed through a lime filter then is chlorinated. Next it goes to a ferrosulphate coagulating tank for flocculating any minerals. Then comes a sand filter and, finally, an activated carbon purifier.

With these advance precautions, the 95-ft.-long canning line is subject to a constant inspection, the removal of two samples from each 1,000-gal. batch for laboratory testing, and hourly Brix tests of syrup, at the syruper. In addition, the use of live steam sterilization and chlorine rinse, plus a novel application of CO_2 gas, provides against last minute flavor contamination or introduction of unwanted air.

Expansible Plant

The 12,000 sq. ft. plant is located just north of Denver's municipal airport, and incorporates a 130x60 ft. space for canning operations, storage area for 80 carloads of empty cans, and three executive offices. Service facilities include a railroad spur, twin truck docks, and an open-area location ideal for later expansion of the bottling plant.

Plant is geared for production of 5,000 cases per day, featuring six popular flavors, for distribution over eleven mountain states. Built to avoid high transportation costs, it features new facilities involving many canning line innovations.

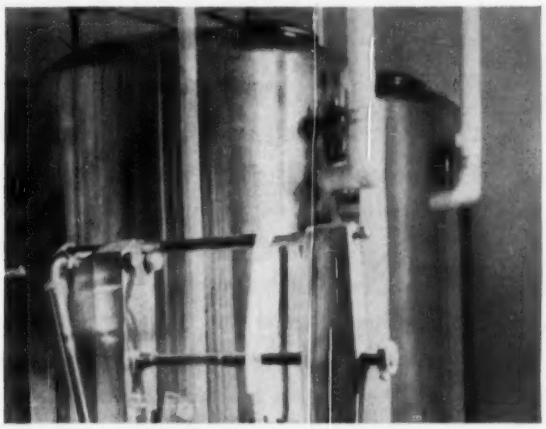
This line was designed by Roy P. Dunn, a veteran of 20 yr. as an installation engineer with Liquid Carbonic Corp., who left that organization to become production supervisor for the new company.

The new line is cited by the White Rock management as probably the most compact in the nation, engineered for minimum conveyor distances between units, which are compatible with repair and maintenance operations.

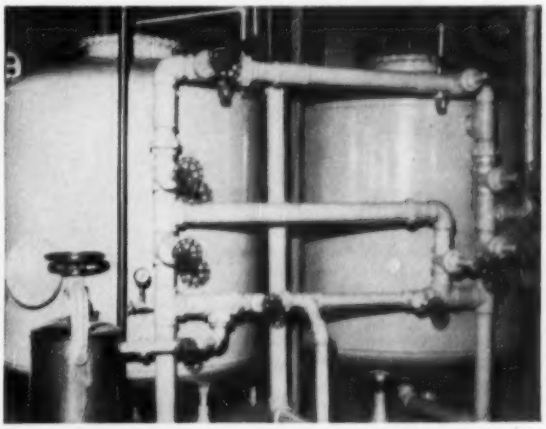
Canning-Line Innovations

Roughly U-shaped, the line begins with the unscrambler, which feeds empty cans to an overhead 21 ft. conveyor. From here they roll into an automatic sterilizer, where each is subjected to live steam followed by a chlorinated water (8 ppm. Cl) rinse. Cans then travel down a sharply-sloped gravity conveyor to the 20-head syruper, which deposits 2 oz. of syrup in each.

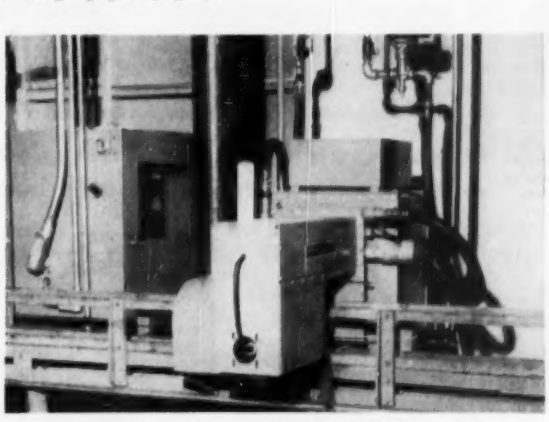
Water, Syrup, Beverage, and Fill Get Close Checks



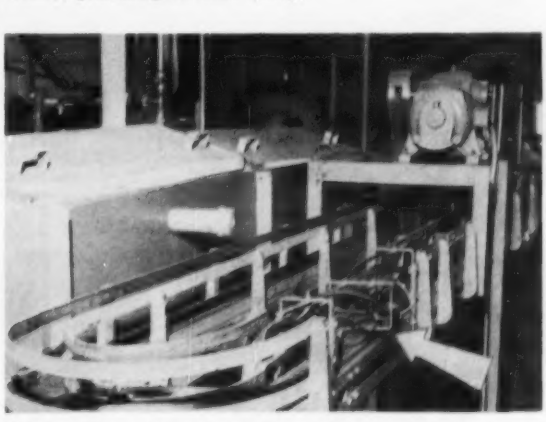
SYRUP is prepared in custom-built stainless tanks (rear), cooled in enclosed plate-type unit (foreground), filtered through paper (right).



CITY WATER passes through lime filter, is chlorinated, goes to coagulator. Next comes sand and carbon filtration (rear), polishing in unit (left).



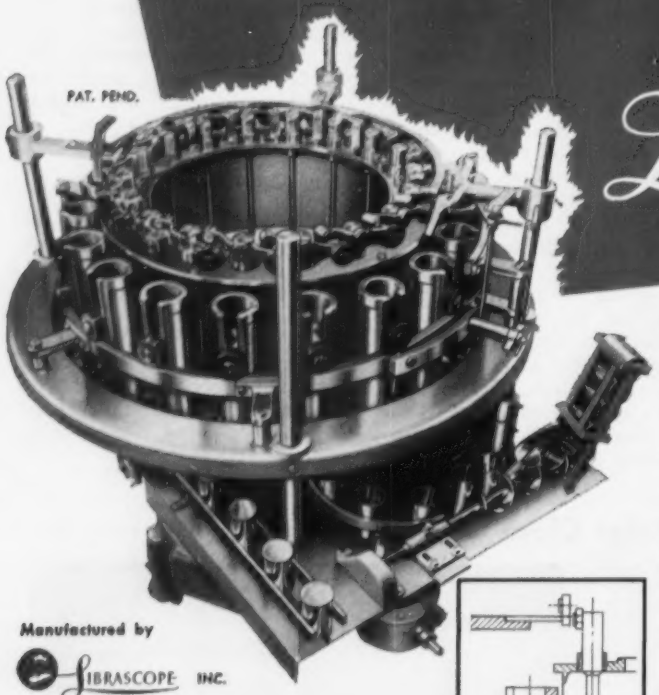
CLOSED CANS are inspected (at up to 300 per min.) for correct fill by X-ray unit that automatically rejects underfilled ones.



CONVEYOR LOOP, 21-ft. long paralleling side of warmer, permitted installation of can-twist unit (arrow) between seamer and warmer.

W. F. & JOHN BARNES ANNOUNCES

NEW *Librascope Filler*



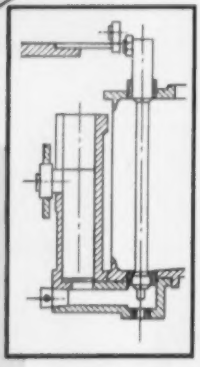
Manufactured by LIBRASCOPE INC.

FEATURES HIGH OUTPUT— LOWER MAINTENANCE COSTS

W. F. & John Barnes now offers a filling machine for liquids and semi-liquids that gives you all of the refinements of accepted and proven practices plus new and improved operating features. Here in one filler you'll find maintenance and servicing features that will save you time and reduce food processing costs.

COMPLETELY DIFFERENT VALVE DESIGN

The Librascope plunger-type valve, shown in the cross-sectional drawing, is a new combination of ideas. A metal-to-metal discharge seat assures more positive closure against leakage of product. In addition, plunger-type valves provide the correct amount of product for the very first containers through the machine. Discharge ports are always clean after each filling cycle. The Librascope free-acting valve operates through a lever arm which removes side thrust and increases valve life.



Cross-section drawing of valve, piston assembly

OTHER PROFIT MAKING FEATURES

- **FAST, ACCURATE FILLING** — Up to 800 containers per minute. New valve design, precision machined pistons assure accurate measurement.
- **SURGICAL CLEANLINESS** — All product contact parts 316 stainless steel or non-copper alloy. Removable one-piece, lift-out valves and pistons assure fast, thorough cleaning.
- **FLAT TOP CAM, LARGE DIAMETER PISTON ROLLERS** — Insure accuracy of fill, prevent skidding and wearing flat spots on rollers.
- **UPRIGHT PISTON HEAD DESIGN** — Pistons enter upright cylinders from top, receiving product from bottom. Closed lower end of cylinders guards against leakage.
- **LARGE TURNING RADIUS** — Cylinders arranged on large turning radius permit a more gradual piston rise, reducing side thrust and rate of wear.
- **A MODEL FOR EVERY NEED** — Twelve different types of 12 - 18 - 27 stations to meet your production and filling needs.

FREE DATA

New brochure illustrates and describes the complete line of Librascope Fillers.

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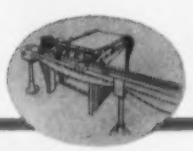
W. F. & JOHN BARNES

Aseptic Canning Equipment

Retort Basket Loaders and Unloaders



Empty Glass Single Fillers

BUILDERS OF BETTER MACHINERY AND EQUIPMENT SINCE 1872

Use of machines follows standard canning line practices with the exception of a "pressure point" installation to invert filled cans in a "twist unit" to mix their contents.

Further, machines are very closely related. For example, cans (protected by plastic cover) travel only 3-ft. from syruper to filler. The latter, a 50-ft. spout low pressure unit rated at 300 cans per min., is located only 4-ft. from the automatic closing machine.

Here a double CO_2 gas jet (an innovation by Supervisor Dunn) insures that every cubic centimeter of air is exhausted from every can. As each can arrives at the filler it passes under a CO_2 jetter that gives it a preliminary flood of gas. Then at the closing machine, an "undercover" jet shoots a final, heavy stream of CO_2 into the can at the second the lid is applied.

This double safeguard, says Mr. Dunn, has worked out to the point where total free air in any can will amount to only 35/100-40/100c.c.

Between closer and warming machine is another of Mr. Dunn's innovations—a 21 ft. conveyor loop that bypasses the warmer, then doubles back before entering it. This loop was necessary to take care of the 2½ ft. twist unit, which inverts the cans, before they are warmed.

It is necessary to maintain a line of at least six cans before and behind the twist section, and addition of the loop provides for at least three times that number. To date, the loop has worked out so well that there have been no instances of cans sticking in the twist.

The standard warming machine brings the freshly-sealed can up from its 38-40 deg. filling temperature (by means of water at 150 deg. F.) to room temperature or slightly above.

"Eyes" Check Fill Level

A distinct innovation on carbonated beverage production lines is the addition of a GE X-ray inspection unit. This tester, located 8 ft. from the warming machine, checks each can for correct fill. And it automatically rejects all underfilled ones.

Choice of this unit followed considerable investigation by Supervisor Dunn, who visited California canning lines before making the final decision. He found that the amazingly efficient unit could be purchased at approximately the same price as a weighing machine, while operating with greater efficiency, where high speed production (300 cans per minute) is concerned.

From here, filled cans pass through a second twist unit, which reinverts them (right side up), then go over 80 ft. of conveyor to a Standard-Knapp automatic casing machine (24-pocket). Filled cartons pass through an automatic gluing machine, and finally through a pressure sealing unit.

After inspection, the filled cartons are palletized and transported by fork lift trucks to storage, at the side of the production line.

At full operating capacity, seven women and six men are required.

White Rock's distribution through the eleven states will be handled by food brokers. And delivery to the "local market" will be by company trucks.

● ● ●

SAVES $$$ by Curbing Test Error

Unit that increases accuracy of Babcock test reading seen reducing costly losses in milk plants

VARIATIONS in results of the Babcock test for fat in milk are minimized, and time required to perform the test is cut by use of a new device called Precision Calipers.

Equipment was developed by Dr. E. O. Herreid, University of Illinois dairy technologist, and it has been in use for some time by a number of Midwest dairies and testing laboratories in addition to the University.

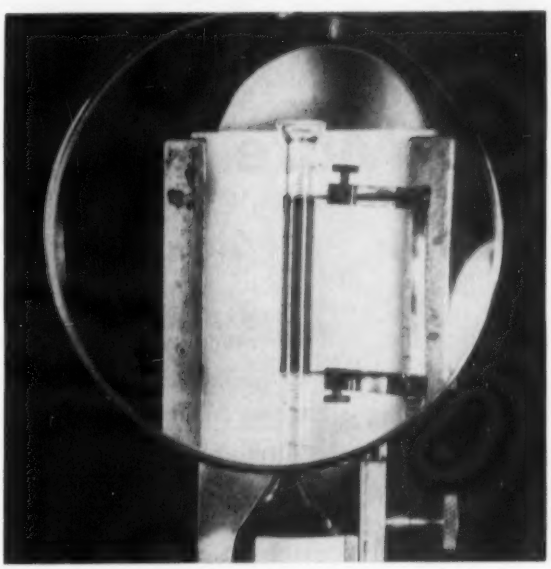
Among dairy users are: The Borden Co., Sidney Wanzer & Son, and Beatrice Foods, Chicago. Latter is also using it in its Galesburg, Ill., plant.

The unit comprises:

1. A stand with heated base to maintain temperature of test bottle contents and thus prevent shrinkage of fat column during reading.

2. A white-lighted background that makes fat column stand out clearly.

3. Adjustable, horizontal needle points held firmly on a movable plate (points are moved on a track by means of knobbed handles).

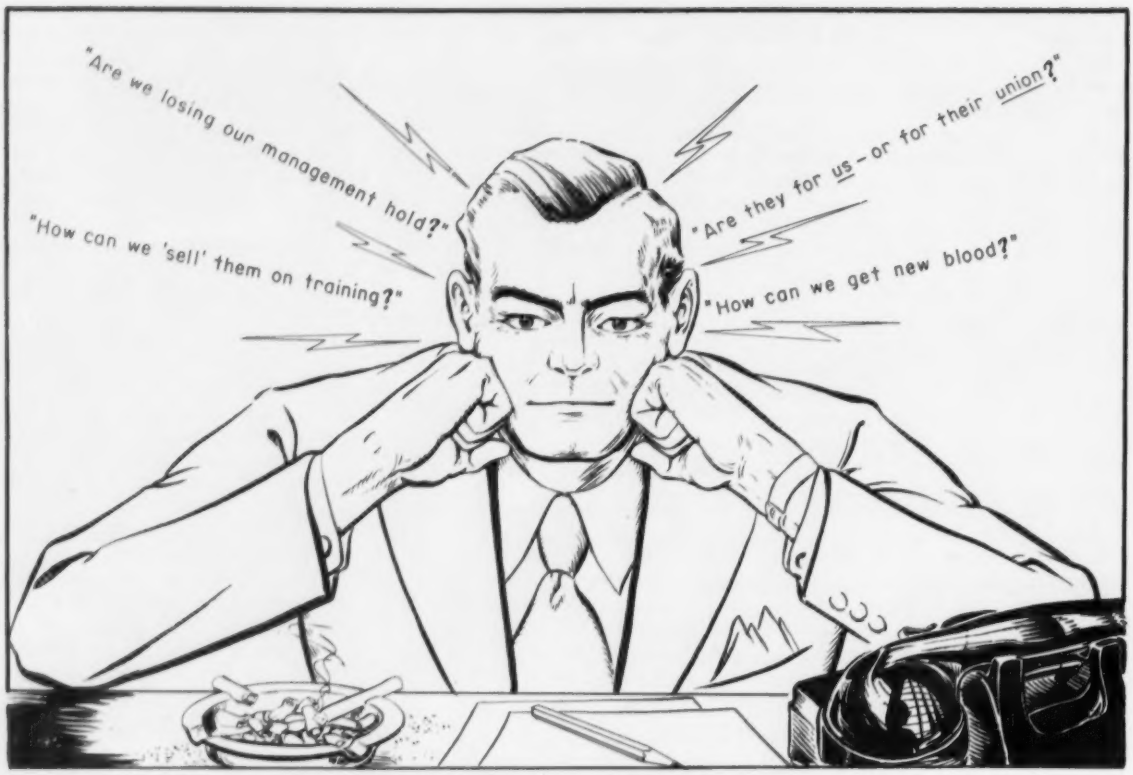


ILLUMINATED background, rigid pointers, and magnifying lens combine to give true fat-column reading.

4. A magnifying lens that increases apparent size of marks on bottle neck.

To make a reading on a previously centrifuged sample, calipers are first raised to approximately the correct height on the stand (using an empty bottle). Then lens is adjusted, to cover entire neck of bottle, and light is turned on.

Next, test bottle is removed from water bath and placed on heated platform. Lower pointer is quickly brought to bottom of fat column, and upper pointer to top of meniscus (see photo). Both points are checked, then plate on which pointers are mounted is lowered until bottom pointer is on zero. Fat percent is then read directly.


"Are we losing our management hold?"
"How can we 'sell' them on training?"
"Are they for us – or for their union?"
"How can we get new blood?"

Problems A-Plenty—But Here's New Light ↓

More Labor-Relations Tips

To Help Balk Slowdowns, Quality Inroads, Profit Losses

★ Management Should Manage . . . ★ Loyalty to Company *and* Union . . . ★ Training keyed to the Man's Need . . . ★ Building Small-Company Management . . . ★ Rehabilitating the Problem Drinkers . . . ★ Pastoral Aid for Employees

IVAN C. MILLER

Associate Editor, "Food Engineering"

Pertinent labor matters extremely significant to top managements of food plants were sifted and winnowed in the 1955 Personnel Conference recently conducted by American Management Assn. in Chicago.

Our spotlight already has revealed vital aspects of the first wave of topics covered in this factual and functional meeting (see "Labor Issues Get Really Ticklish", FE Apr., p. 64). And so we now swing on with our beam to bring out highlights of six more of the pointed talks.

First, there are warnings of the price paid when management abdicates its responsibilities in mutual agreement clauses of labor-management contracts. Then the subjects range through allegiance, training, and recruiting and continue on to personnel drinking problems and, finally, to values available in spiritual guidance of workers.

Management Should Manage

In some cases "mutual agreement clauses" in labor management contracts can be a real threat to company survival, warned Mathew W. Gouger, vice-president, General Analine & Film Corp.

This was not, he emphasized, an attack on the principles of mutual agreement. "Our labor contracts themselves represent a mutual agreement to do certain things in our employer-employee relationship. Rather, I am concerned with the clauses calling for mutual agreement before we can do certain things. These cost us heavily in time."

He went on: "Increasingly, labor asks mutual agreement on who shall be hired and how many, promotions, demotions, discipline, discharge, shift assignments, location of work, and rates for new jobs. These clauses have a very substantial, if not controling, effect on labor efficiency. They create slow and ponderous administrative procedures and time-consuming delays that are costly, not only in direct expense, but also in competitive disadvantages.

He then described rates of pay and labor utilization as

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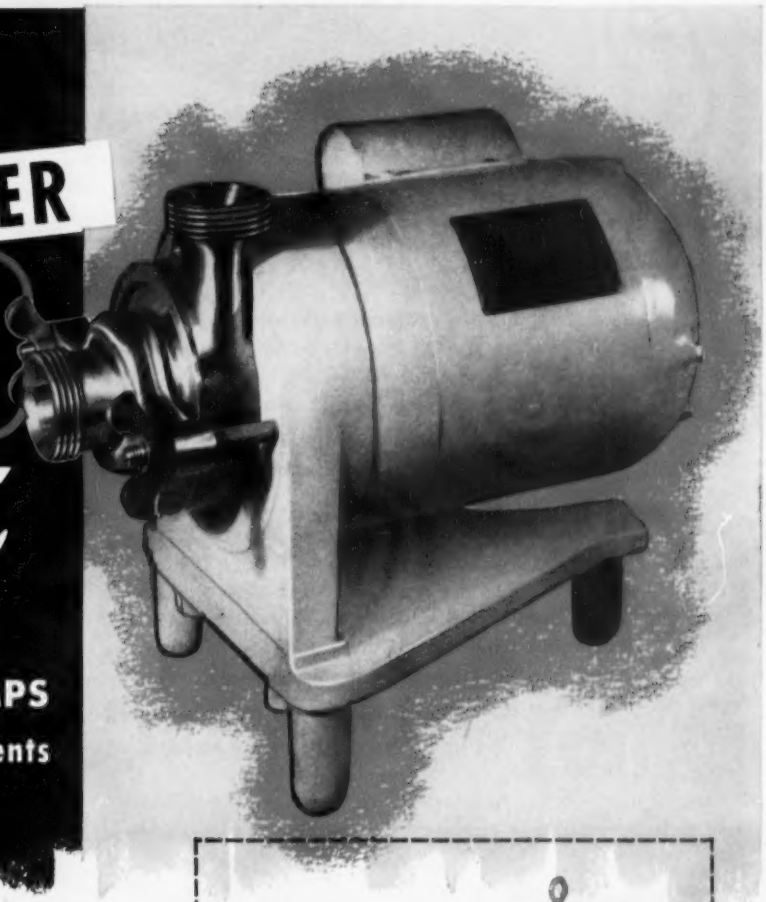

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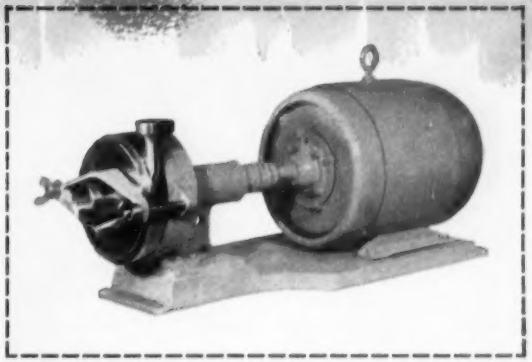

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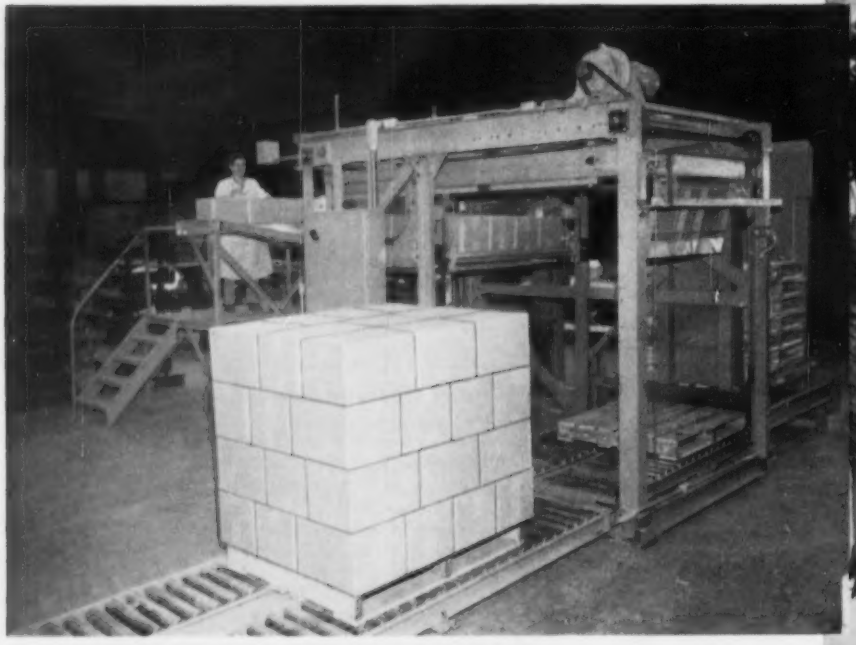

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two basic labor-cost elements, saying, "Time is the key to utilization." Then he cited three examples:

1. One plant recently struggled for weeks to shift 20 people and thus step up production–struggled because the contract provided for mutual agreement on schedule changes before work could start.

2. Another plant lost a large Army order because work could not be initiated in the time specified. For there had to be mutual agreement on starting the shutdown equipment before work could begin.

3. A third company has had facilities valued at $6 million ready to go into production for four months. However, mutual agreement must be reached on rates of pay before the equipment can start running.

Losses from such clauses are staggering, according to Mr. Gouger, and usually both company and employees suffer. Yet, he said, this situation can be corrected with no loss in position or protection by either party.

"The labor philosophy which provides in part that management must manage and must be responsible for its management is," he held, "a sound starting point to resolve these problems."

Further points: If, in carrying out its responsibilities, management transgresses the legitimate rights of employees, the right of redress by grievance is available. Time limits, provisions for retroactivity, and so on, preclude any possible unfairness to the employee. "It is more fruitful for management and labor to concern themselves with the mutual values of remaining economically and competitively strong, rather than the matter of who runs the plant."

Mutuality clauses, he charged, create hazards to the security of both labor and management, placing them in "untenable positions of stewardship."

He asked: "Can the union official, whose stewardship calls for prosecuting the interests of those he is elected to represent, agree to the discharge of a 15-yr. employee who struck a foreman in a moment of emotional stress? And is it fair for management to ask him to agree on discontinuing a product line, and laying off 200 employees?

"A far sounder premise is for management to manage, and not impose its responsibilities upon the unions."

To achieve a labor contract that will keep the company competitive, said Mr. Gouger, management needs the following:

1. A comprehensive knowledge of rates of pay, fringe benefits, and other economic provisions of local industry and of all industry, as well as detailed knowledge of contract provisions in the industry and in the local area.

2. Thorough knowledge of labor costs as they apply to each operation, from raw materials through sales and collection.

"Unless the cost of labor in a given operation can be determined, how can the value of removing or modifying restrictions on its use be determined?"

3. A complete analysis of the labor agreement, with measurements as precise as possible of the costs to the company of its provisions, both actual and potential.

4. A continuous specific projection of the makeup of the labor force under the changes in technology and methods that management is planning, and the resulting implications for the labor agreement.

"The industrial relations executive must sit with the top planning officers of a company and be in a position to plan and prepare for negotiating modifications in the labor contracts to accommodate the planned changes."

5. A positive, specific program covering the objectives of the labor agreement.

"Contract negotiations today are too often 'crash landing' affairs," he lamented. "We of management are too much on the defensive and too prone to bargain from the union's list of demands. The ideal contract, of course, can never be a static affair. It must change to provide for changes.

"But the fact that the future is not sure is no reason for not planning for it to the best of our abilities."

6. Complete support of all levels of management, including the board of directors if necessary.

7. Most important: Establishment of a realistic, clear-cut philosophy of labor-management relations.

"This philosophy should be communicated to all employees and be well understood by their union representatives. It should guide the acts of all levels of management at all times."

Loyalty to Company *and* Union

Dual allegiance of workers to both company and union is not only possible, it is a fact, declared Loyola University's Father T. V. Purcell, assistant professor of psychology and industrial relations.

Reporting on his four-year research among members of Local 28, United Packing-House Workers of America (CIO), in the Chicago plant of Swift & Co., he told of seeking answers to three questions:

1. Will the worker have allegiance to both union and company?

2. Will he see in his local union and his company two organizations which are necessary for his welfare and satisfaction of his needs?

3. Will these allegiances of the worker be under any strain? That is will they tend to pull him more toward the company, or more toward the union? And is there possibility here of a satisfactory solution?

Out of a sample of 202 employees, 92% had allegiance to Swift. By allegiance, the speaker explained he meant not strict loyalty, but an attitude of approval of the basic existence and overall objectives of the company.

This did not necessarily imply worker satisfaction with everything. But even if employees were not satisfied with their foremen, for example, or advancement policies, they could–and a great majority did–have general allegiance to the company.

Strong factor, said the speaker, was the fact that Swift provided steady work. Another point was the fair treatment received by workers, who felt the company generally manifested an advanced personnel policy.

Union allegiance he also found to be a clear fact, although not so pronounced as company allegiance at the time of the study (1950). Nearly 80% of rank and file workers exhibited definite allegiance to their union as an institution.

Here again, Father Purcell said he didn't mean the workers were satisfied with everything. But nevertheless they had basic allegiance. He summarized:

"The worker mainly wants his union because it gives him a grievance procedure, and also because it gives him plant-wide seniority. And wages also are a factor, especially for younger men who have families.

"Nearly 75% had a clear allegiance to both company and union. And this was characteristic of nearly 90% of the union stewards. The union, at this time, was going through a crisis that tended to weaken the union allegiance of the workers. Since then, the union has become stronger.

"The worker sees no essential conflict between his two loyalties, finding both organizations necessary. However, being more identified with their particular organizations, the stewards were under some strain, their allegiance to one organization tending to pull them away from the other. Still, the majority of these men retained dual allegiance.

"In a local plant community," concluded Father Pur-

cell, "we find what may be called 'harmonious opposition.' And I think this offers possibilities of greater dual allegiance in our mass-production plants. The worker's position of, and desire for, dual allegiance can make for greater industrial peace."

Training Keyed to the Man's Need

Top management's claim that the first line supervisor is a part of management is an understatement. Actually he is management, especially to employees under him.

So asserted John J. McCarthy, consultant in employee relations training, General Electric Co.

He described GE's plan for personalizing its supervisory training, and went on to warn that "high-sounding policies enunciated by top management, sincere though they may be, fall on deaf ears—unless the first-line supervisor implements those policies with those who report to him.

"Impressive sums spent on employee-relations activities invariably fail to return a profit when the first-line supervisor doesn't fully understand that, in the view of his employees, his actions represent the company."

The speaker summarized GE policy as follows: Be right. Act right. Tell your employees about it. Tell the community about it.

Many supervisors, he pointed out, failed to "act right", not because they want to do a poor job, but because they are selected carelessly—as on the basis of job knowledge rather than on genuine supervisory potential—and further because they are not adequately trained.

Some companies, according to Mr. McCarthy, are doing nothing at all about this problem. Others have developed a variety of courses on subjects ranging from speed reading to sematics. Many of these are useful, some important, a few essential.

"Granted, there are some courses that all supervisors need. But actually these are few in number."

He then cited GE's adaptation of the program of personalized training developed by Walter Sherman and his group at Kelly Airforce Base for teaching non-supervisory employees.

The company's move here is a first step for development of first-line supervisors. Each man is scheduled for the training that he, as an individual, needs to fill the gap in his performance. The boss can see this gap. And it can also be recognized by the employee, himself—if the facts are presented to him in the proper light.

"When a supervisor has had an important hand in spotting gaps in his own preparedness and performance, he then takes the training willingly—even eagerly. The 'I'm too-old-to-learn' attitude is broken down." Further points:

Countless thousands of dollars, and equally important hours off the job, are saved because the man takes only those courses that he actually needs.

The booklet he gets on the personalized training plan gives him constant reassurance that he is being regarded as an individual and that the company is really interested in him as an individual. Training and the spotting of needs are placed where they belong—in the line, and specifically in the hands of the second-line supervisor.

As a result, the value of the training becomes apparent to the specific employees—who in many organizations have tended to term such training as "Long-haired stuff" or "Boom-doggling."

Building Small-Company Management

Concentration on nearby schools for college recruits for small companies was described by Howard E. Clark, industrial relations director of Albany Felt.

"We prefer going to small liberal arts colleges when technical training is not required," he said. "For we believe a boy who would choose such a college, where he's not 'lost in the shuffle', is more interested in a small company and will be accustomed to the close personal relationships in our work situation.

"The industrial relations department makes the college contacts. But our actual interviewing is divided among members of the executive group. Candidates are given 30-min. with each of seven to nine of the company's key executives.

"We are not trained interviewers, but we believe the subjective opinion of several executives helps us, as a group, to determine acceptability of prospects. Further, when we are in general agreement and a man is offered a job, he knows he has the backing of the executive group. And once he is in, each member of the group is anxious to help him succeed.

"Albany Felt's training is not a continuation of school," said Mr. Clark, "and we don't plan on losing a percentage of the trainees each year. We can't afford to train a group and later cut it down to the number we require.

"Except for the initial two to three months, we give the men productive work. They work on jobs we want done, and are evaluated at the same time.

"Each man is hired for a specific area, and individual training schedules are prepared to give each one the experience that would be most helpful to him in the area of his final assignment.

"Training begins in the plant, where the man is expected to do unskilled work in the department and learn as much about an operational job as time permits. The second phase of the training includes 'investigation projects,' usually within the department where the trainee will be assigned permanently. He works on problems where we want answers. None of these projects is 'made' for the trainee.

"Selection and development of key supervisors and management men are not limited to college trainees. The same opportunities are offered to competent production people already employed, whether they went to college or not.

"At intervals, supervisors are asked to suggest the names of those whom they feel have potentialities for higher responsibility. These candidates go through the same selection and training processes as do new graduates.

"In addition, plant and office supervisors at all levels have been selected to visit customers—to get first-hand knowledge of how our customers use our felts, to observe the factors that influence felt life, and to realize the importance of quality.

"Executives and supervisors are sent to American Management Assn. seminars to acquire a broader perspective. And workers being groomed for supervisory jobs are given intensive six-week summer courses in manufacturing operations.

"While these workers are away, their jobs are filled by trainees. So in each instance two men benefit from the training.

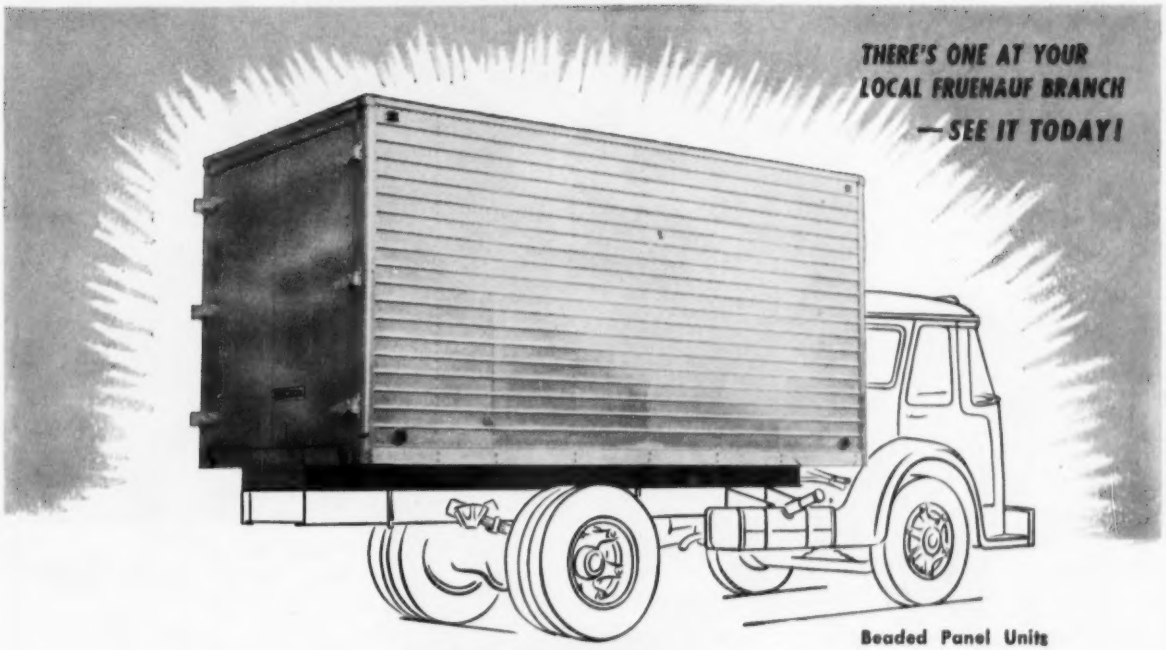
Rehabilitating Problem Drinkers

Companies that succeed in helping their "problem drinkers" will be rewarded—not only by increased efficiency and decreased absenteeism, but also through the salvage of their skills and experience.

This was the prime point made by S. Charles Franco, assistant medical director, Consolidated Edison Co. of New York.

In the seven years this company has had a formal pro-

(Turn to page 114)



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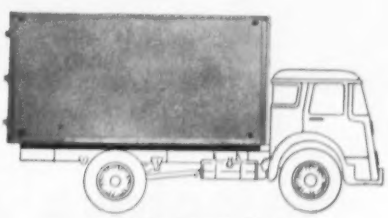
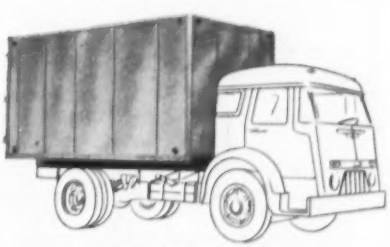


Smooth Panel Units



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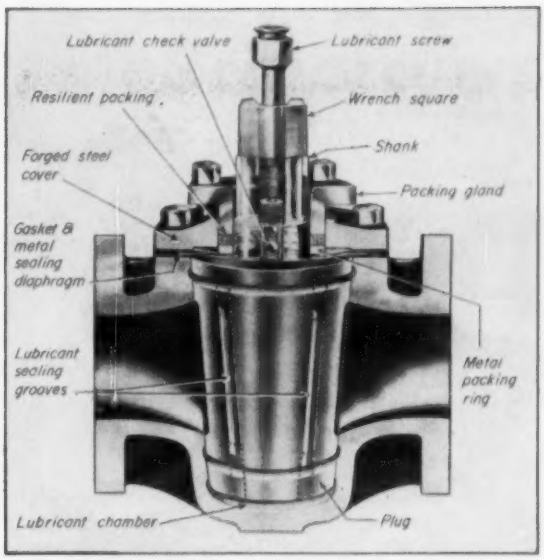
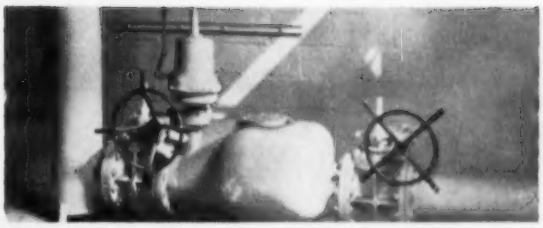
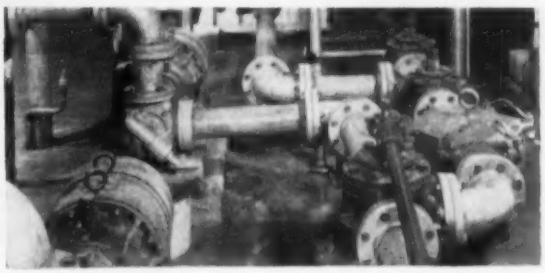


BASIC PARTS of unit: Body, cover, and plug, and lubrication system. Cylindrical and tapered forms are made.



GAS MAIN utilizes lubricated valve to eliminate leaks.



LIQUID SUGAR manifold at new Nabisco bakery in Chicago has lubricated plug valves.

Lubricated Valves Cut Waste And Reduce Maintenance

For both general-service and process-line use easy and fast acting unit has positive cut-off

CHARLES J. KENTLER
Technical Consultant, Rockwell Mfg. Co., Pittsburgh

Quick and easy operation, plus tight closing, make lubricated plug valves particularly useful in the food processing industry.

These valves are efficient in handling gummy, sludgy, or heavily viscous products. Pressure lubrication, applied with the rotary principle, eliminates internal cavities which might pack with sludge solids and jam the seats. This valve seat is not exposed, and line material is sheared off by a knife-like action of the plug as it rotates past valve throat. Galling or freezing is eliminated by turning a lube screw which frees the plug for easy turning, avoiding "forcing" with a hammer.

In one class of application, standard semi-steel valves are used for general plant services, such as water, low-pressure steam, fuel oil, stand-pipes, compressed air, and gas. Characteristics of this valve practically eliminate drippage, leaks, and waste.

A second class is applied directly to processing, and may be included in lines handling shortening, chocolate, syrup, oil, molasses, sugar solutions and other materials. Also, these valves can be used for tank manifolds, sampling, by-pass, and mixing lines. They may be made of semi-steel or stainless.

The lubricated ground-joint shoulder is compact and combines the functions of a stem seal and thrust bearing.

Application of this seal principle is the same for all standard types—two-bolt cover (which combines cover and gland in one piece), screwed gland, and bolted gland. In all three, shoulder-thrust is transmitted through a resilient cushion packing and sealing gasket. The latter is a thin flexible metal diaphragm of anti-friction and corrosion-resistant material.

The clamped diaphragm assembly does not rotate. As valve is turned between open and closed positions, a ground surface at the top of the plug slides freely against the diaphrgm. Leakage is prevented by a lubricated close fit between the two parts. Turning thrust is carried on the lower, greased bearing surface of the plug.

The two-bolt, cover-type valve has a square wrench head on the plug stem, and a stop-and-indicating collar which serves as a weather shield for stem-clearance space. Other types have wrench-flat or wrench-square plug shanks, with stop-collar located on the shank and engaging lugs on the cover or gland.

There is no projecting yoke, bonnet, or underhanging body to require room below pipe line or manifold.

For lubrication, an elongated screw is threaded into the outer end of the plug shank and develops ample pressure—yet turns freely due to the use of a fine-pitched thread. Lubricant sticks are inserted through this opening to keep system full.

Grease is distributed around the plug and valve body by means of grooves divided between body and plug. These channels are placed so that sections are disconnected from the supply before they are brought into contact with line-fluid space. Grooves automatically reconnect when plug is in fully opened or closed position. Thus valve can be "cracked" without blowing grease.

Lubricants used in the food industry are white, edible, and completely non-toxic.

Valves are available equipped with standard or special accessories to facilitate remote handling and lubrication.

A simple program of periodic lubrication, which takes a minimum of time, will keep the valves in service for the life of the piping. In fact, some have been taken from old, worn piping and re-installed in new lines.

a juicy problem

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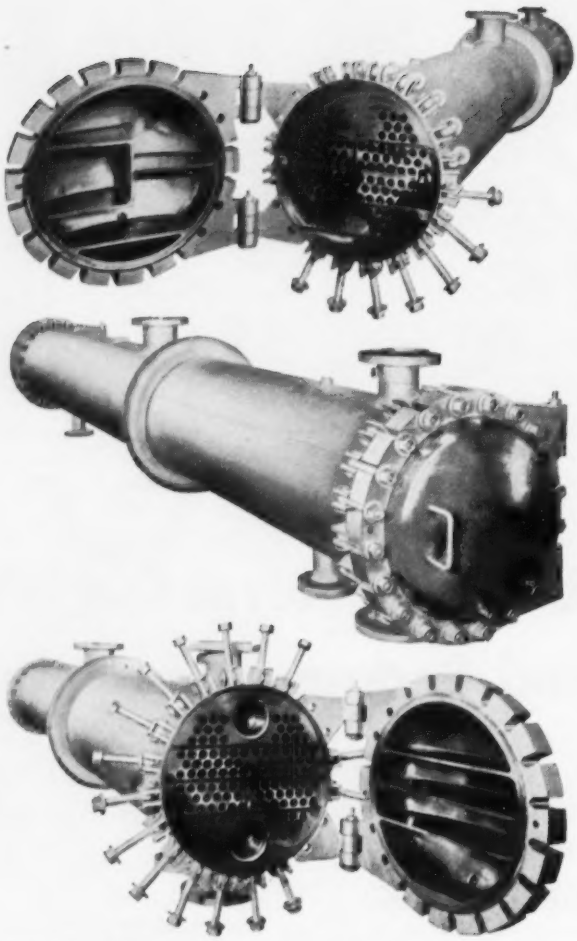

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Researchers Evaluate . . .

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Packaging problems • Storage changes in animal fats
New facts on food poisoning • Curing of whole animals

FE STAFF

Ionizing radiation, acetoglycerides, and reports on improving meat quality got top billing at the recent Chicago-held 7th Research Conference. Sponsor was the Council of Research of the American Meat Institute.

Uses of ionizing radiations for meat preservation were summed up this way by H. Pocmeranz, QM Food & Container Institute:

Big hindrances to radiation sterilization are flavor impairment and cost.

Ahead is a very long and hard road before meats can be commercially preserved with irradiation techniques. Appearing, however, are enough encouraging signposts to show that research is slowly catching up.

Some success has been achieved in controlling irradiation-induced changes by using additives (ascorbic acid, for example) and by employing varying vacuums, temperatures, and storage conditions. Special promise is seen here in the investigation of food-preservation irradiation by about ten research groups directed by the Armed Forces.

Best possibility at present is partial sterlization of meats by subjecting them to a dosage of 250,000 rep. (Roentgen equivalent physical) instead of 2,500,000 rep. for complete sterilization—and then refrigerating to extend shelf-life more than five times. Such treatment can be controlled so that changes in color, flavor, and odor are negligible.

As for equipment, electronic accelerators are being improved in capacity and reliability. Recently, General Electric revealed a 4-million-volt cathode-ray unit.

Availability of gamma sources is also being augmented in conjunction with the peace-time application program sponsored by the Atomic Energy Commission along with wide acceptance by private enterprises. Under construction at Oak Ridge is a new plant for producing, from fission-product mixtures, 20,000 curies per year of the long-lived isotope cessium-137.

Based on the cost of today's man-made generator, operating at a 70% efficiency and a 1,000,000-rep. level, 670 lb. of meat can be irradiated hourly at a 4.6c.-per-lb. experimental cost and a 1.5c. production cost.

At the meeting colored slides showed significant contrasts between irradiated and non-irradiated meats.

For instance, ground pork or hamburger (15% fat), canned and frozen, then given dosages of 3,000,000 and 6,000,000 rep., showed up brighter red than the non-irradiated canned and frozen samples—brighter, in fact, than the original meats.

Greater, however, was the color contrast between irradiated and thermally processed (canned) ground beef, hams, and beef tenderloin (American Can Co. samples).

Unique Modified Fats

R. O. Feuge, USDA, discussed the unusual properties of a group of modified fats (acetoglycerides) containing 10-20% by weight of acetyl groups.

Unlike the usual stearins, the acetostearins, when solidified by cooling, crystallize into a waxy form that is stable under practical conditions. Acetostearins, prepared by completely acetylating monoglycerides from highly hydrogenated cottonseed oil or lard, melt at just above room temperature. And they can be used in applications requiring oils having exceptional resistance to oxidation.

Acetoolein products possess a relatively low iodine value, 57.6 for pure diacetoolein. Yet the melting point of these products can be as low as −20 deg. C.

In oiliness, resistance to hydrolysis, permeability to moisture, and lack of flavor, odor, and color, the acetoglycerides resemble ordinary fats.

A number of potential uses have been suggested for the acetoglycerides. For example, acetostearins might be considered as coating materials for frankfurters, other processed meats, cheese, nuts, fruits, and baked goods. They might also be used as a highly stable roasting oil for nuts and as coating materials for certain types of candies.

Acetooleins are being investigated for use in a special margarine-type spread (with storage life of 6 mo. at 100 F.) desired by the Armed Forces. Such a spread would contain a mixture of acetooleins, salt, partially hydrogenated cottonseed oil, antioxidants, butter flavor, and color.

Tests have indicated that both acetostearins and acetooleins may be employed to advantage as plasticizers for a number of resins.

Many of the potential uses for acetoglycerides depend upon their being edible. Extensive feeding experiments are underway to establish this point. On the basis of results to date, it is anticipated that proof of edibility will be obtained.

What About Color?

From a color standpoint, pointed out E. W. Hopkins of Armour and Company, it is significant that researches indicate that undenatured proteins oxidize faster than the denatured.

To a meat processor smoking cured hams, for example, it means that insufficient temperature during smoking results in formation of an undenatured protein that rapidly discolors (grays), even in the absence of light.

Chemically, this is what takes place: Insufficiently "smoke-heat" denatured protein—nitrosomyoglobin (red colored)—swiftly oxidizes to the undesirable brown-colored protein, metmyoglobin. But when the ham is subjected to sufficient smoke-heat to denature the nitrosomyoglobin, there is formed the slow-to-oxidize protein, nitrosomyochromogen (the typical red pigment of cured meats).

Packaging Researches

L. J. Bratzler, Michigan State College, discussed problems of pre-packaged fresh and frozen meats. With the fresh, he said, sanitation and correct temperature control are necessary throughout the merchandising cycle

for acceptable color and satisfactory display life. Also, lack of wrapper durability is still an important cause of re-wrapping.

If frozen packaged meats are going to sell, problems on color and visibility will have to be overcome. Researches directed toward solving these roadblocks will be repaid in lower marketing costs. For it's frozen meats, rather than the fresh, that lend themselves to centrallized pre-packaging.

An attractive artificial red color can be formed on the surface of frozen meats by gas-packaging with carbon monoxide. This gas has little effect on bacteria on the surface of meats.

Changes in Fatty Cuts

Summarized by O. S. Prinett, Hormel Institute, were the changes that take place during storage of fats in cuts of beef, lamb, pork, and turkey—

1. Composition of animal diets appears to have little effect on the rate of deterioration of fatty acids, but it may exert an essential influence on the rate at which whole cuts become rancid.

2. Irrespective of species, meat cut, or diet, none of the meats underwent appreciable oxidative deterioration of fatty acids when stored at 33 F., up until the time the meat became unpalatable because of other deteriorative changes.

3. Although all cuts became unacceptable due to rancidity after prolonged low-temperature storage, it was only the surface fats that appeared to be oxidized. Overall losses of essential fatty acids were generally insignificant from a nutritional point of view, except for possible toxicity hazards from rancid fat.

"Staph" Illnesses

There are still misconceptions on staphylococcus food poisoning, reported C. F. Niven, Jr., of AMI—among scientists as well as the consuming public. But there's sufficient data to resolve them and to offer grounds for eventually eliminating this public health problem from the food industry.

Staph food poisoning is largely confined to hams in the meat-packing field, and it results from product abuse following processing.

Test evidence indicates that staphylococci, deliberately added to curing pickle, do not grow in or on hams during curing and smoking. Conventional smoking times and temperatures are enough to assure absence of living staph in hams removed from smokehouses.

Air seems of minor importance as a source of this type of food infection. Surveys on foods displayed in retail markets revealed the rarity of staphylococcus as a contaminant.

Curing Before Dressing

F. E. Deatherage, Ohio State University, reported on experiments seeking to set the color in an animal before it was dressed.

A curing solution was pumped into the circulatory system of a couple of cows after slaughter—and the result was a delightfully tender meat.

During efforts to track down the responsible ingredient—salt, sodium nitrite, or sodium nitrate—a pure sodium chloride solution was used. And here some of the meat didn't drip (lose meat juice when frozen and then thawed).

● ● ●

More Labor-Relations Tips

—*Continued from page 108*

gram dealing with alcoholism, 55% of the 290 cases uncovered have had their drinking problem under control for one to six years.

Cases that had the benefit of special clinical treatment averaged more than 70% rehabilitation after a follow-up of at least two years.

In addition, said Dr. Franco, absenteeism has been greatly reduced. In view of the increased rehabilitation, with savings in separational allowances and retirement pay, and the reduced absenteeism, we can say that the program more than pays its own way. Anyone who works closely with the company program cannot help but be impressed by the improved employee attitude.

"Also, as a result of this program, supervisors and foremen gain a valuable experience in a difficult human relations problem.

"Statistics as to the incidence of a alcoholism in industry vary a good deal, and some deny that it need be considered a problem. Our company," said Dr. Franco, "finds new cases run about 1½ to 2 per thousand employees per year, with total cases in the past seven years something over 1% of employees.

"However, we believe the real incidence in industry is between 2% and 3%, because cases tend to be 'hidden', even in companies having a program."

Con Ed officially recognized chronic alcoholism as a medical condition in 1947. And it then decided to "meet the problem openly instead of perpetuating the outworn pretense that it did not exist."

Aim was three-fold: (1) Early recognition of the employee with a drinking problem; (2) his rehabilitation, if possible; and (3) establishment of a consistent basis for termination of employment when rehabilitation fails.

Foremen and supervisors are responsible for the recognition step. They are helped to spot such cases through training conducted by an industrial relations team, with the medical department serving in an advisory capacity.

The employee first gets a preliminary warning from his immediate superior. And with recurrence, he's placed on probation.

Persons employed for two years or less may be discharged for the first offense. And it's noted that handling of those on probation may differ, depending on their length of service.

The employee on probation is examined by the medical department to gage the extent of the problem. If this confirms the drinking problem, the employee is offered rehabilitation through company facilities, Alcoholics Anonymous, or a physician of his own choice.

If the offense recurs after these steps, the employee is suspended and a panel is convened. A worker of less than 15 yr. continuous employment may be terminated at this point without further panel consideration.

Of those terminated by panel action, 33% have been granted disability annuities, with the remainder receiving limited disability allowances. A few have been discharged for obvious misbehavior.

Major shortcoming of the program in the early period was lack of medical facilities for adequate treatment.

Convinced of the need for a special treatment center, Con Ed underwrote the cost of launching a consultation clinic for alcoholism at the University Hospital of New York University—Bellevue Medical Center.

Since opening of this clinic in 1952, other companies have joined in its use and support. Meanwhile, the treat-

(*Turn to page 196*)

HERE'S PROOF it pays to package in film made of BAKELITE Polyethylene

Packaging made by **Shellmar-Betner Flexible Packaging Division, Continental Can Co.**

"big savings and a powerful impetus to sales"

That's the sum and substance of *all* the advantages found in polyethylene packaging by Northwest Popcorn and Seed Co., Delaware, Ohio. Crediting polyethylene with anticipated zooming sales, John Jeisel, Jr., founder and president, states:

"Not only does polyethylene take printing well . . . but it retains its natural toughness and pliability when stored under varied temperatures. I can truthfully say that we've had absolutely no breakage under normal handling.

"The packages stack easier on shelves, don't slide, and require less space. Polyethylene bags seal quicker . . . cut down production man-hours. Moreover, it is essential that moisture remain stable. With polyethylene, moisture remains the same even for months. Also, the danger of insect infestation is reduced.

"All in all, these features make the storekeeper happy and willing to buy and stock our popcorn in larger quantities . . . increasing sales and saving handling and bookkeeping costs."

Why not see your packaging supplier today and put the same beneficial qualities of film made of BAKELITE Brand Polyethylene to work for you.

SPECIFY FILM MADE OF

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The term BAKELITE and the Trefoil Symbol are registered trade-marks of UCC

In Behalf of Progress . . .

Professor Politics Stymie Food Education

It's not news that too few people are being trained specifically for technical careers in food manufacturing and allied fields. And with processes fast becoming more highly engineered as controlled continuous methods replace batch, the situation is going to get a lot worse before it gets better.

Who's to blame for this educational shortcoming—for the fact that the situation is much worse in the food field than in other major areas of engineering, technology, and science?

A little blame can be laid at a lot of doorsteps. Food manufacturers and their trade associations must take a share for not publicizing the opportunities of their industry.

The high schools, too, have been amiss in not acquainting technically inclined students with the food industry and its career potentials.

But here we want to point the finger particularly at the colleges and universities. Too many times has progress in establishing a full-fledged course in food technology or engineering been stymied by ignorance as to what is required. And this ignorance has been aided and abetted by jealousy, bickering, and politics on the part of well-entrenched departments.

Colleges and universities which are strong in agricultural education ought to be more interested than they are in training food technologists and engineers.

But some of those that are interested have gotten nowhere because everybody wants to get into the act. Agricultural Engineering wants the new course under its wing. So does Horticulture, or some other branch of the agricultural school. Or maybe the Chemistry department wants the new offspring.

Then some colleges have strong courses in one branch of food processing, such as dairy or canning. And the well-established head of such a course may set up a nice political barrier to a broader program of education in food manufacturing.

Now in addition to the bickering over the new baby, some campuses fail to grasp the right fundamental concept of a sound course in food technology or engineering. Too many think that it should be built principally on the sciences of chemistry, bacteriology, and biology. A few would even hammer hard on horticulture. And many prefer to let the would-be technical food man take a makeshift combination of subjects in various schools and come out with a nondescript degree in science.

It's about time that those who direct technical education in the colleges and universities wake up to the food industry's requirements—and to its opportunities. And time for them to brush aside campus jealousies, bickerings, and politics so that effective schools and curricula can be established in more institutions of higher learning.

There really is very little relation between a course in food technology and one in farming, or even one in home economics. Food technologists and engineers must be trained in the practical technical aspects of food processing.

This means that their advanced courses should be built basically on the engineering involved in unit operations—just as in chemical engineering.

As a matter of fact, it would be much wiser for any college or university to have its chemical engineering school set up a food technology or engineering course, rather than to put the job into the hands of agricultural departments.

But, of course, the right way to do it is to establish an independent school or department to train people for the food manufacturing and allied fields. And plan a curriculum that really meets the requirements of the field. Much of the teaching, of course, could be done by other departments. But it should be under the direction of the food school.

The food industry is too big, too vital, and too short of properly trained technical people to tolerate the present snail's pace at which food education is progressing.

It's up to leaders in the industry to influence the thinking in institutions of higher learning.

Made Great Contribution

With the passing of Dr. E. J. Cameron, on March 21, the food industry lost one of its mainsprings of technical progress.

Thirty-two of Dr. Cameron's 59 years were spent in the research laboratories of National Canners Association. Director of the Washington laboratory since 1939, he had been named overall-director of the NCA labs shortly before his death. Last year, he received the Babcock-Hart Award for his contributions to better nutrition.

His practical scientific contributions to food processing in more than three decades are of inestimable value. Loss by spoilage of canned foods that would have occurred but for his work in bacteriology would reach astronomical proportions. Commercial processing of vegetables and fruits would not have the stature it does today. And human nutrition would be on a lesser scale.

But Dr. Cameron was more than a scientist. He was a person with great personal depth, with devotion to his friends as well as his work. And his was a warm and buoyant personality that gave a lift to those who came in contact with him.

Dr. Cameron will be sorely missed. But his work lives on to serve humanity in the years ahead.

From his career, other technical men in the food industry can take great inspiration.

If your customers gave your products a "bug count"

These Petrie dishes give a graphic demonstration of the high degree of spore and yeast removal that can be achieved with Celite filtration.

CELITE FILTRATION removes spores and yeast plus all suspended impurities

How can you be sure that your products are at their very best when they go into the laboratory of an important customer or prospect? One good way is to use the most thorough method of clarification available. That's Celite* diatomite filtration which gives you a filter cake hundreds of times finer than the finest wire mesh. It not only removes suspended impurities, but polishes filtrates to a brilliant sparkling clarity.

Celite is as economical as it is thorough. Only small amounts are required to keep the filter cake open. Fastest flow rates are obtained from the 2,500,000 filter channels in every square inch. And Celite can be used with almost any filter. Automatic operation eliminates the need for costly skilled labor.

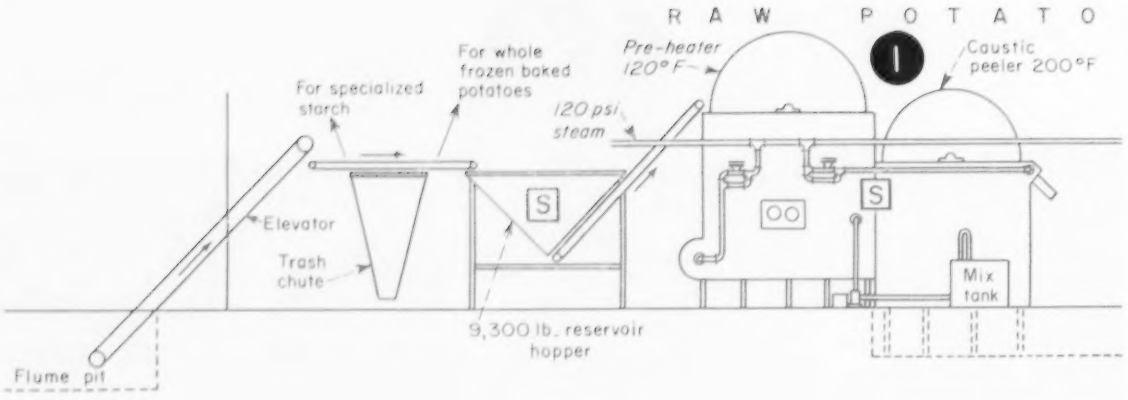
Celite is being used successfully today for filtering sugar, beer, syrups, jellies, cooking oils and fats and many other products which at some stage are in a liquid state. Perhaps it offers advantages for your processes too. Write for full facts today.

For further information on Celite filtration for your products write to Johns-Manville, Box 60, New York 16, N. Y. In Canada, address 565 Lakeshore Rd. E., Port Credit, Ontario.

*Celite is Johns-Manville's registered trade mark for its diatomaceous silica products

JM PRODUCTS **Johns-Manville CELITE FILTER AIDS**

PREPARATION



Dynamic 3-Line Mechanization

Astute Company Engineering Marks Advanced Multi-Product Processing

ADVANCED ENGINEERING is an all-out policy at J. R. Simplot Co., Caldwell, Ida., where 14 potato products are handled on 3 major lines. Of these, frozen French fries, potato patties, hash brown and shredded for mashing, and dehydrated granules and a cubed product are produced in greatest volume.

Mechanization begins as flume-washed potatoes are volumetrically metered from storage to peeler by a variable speed conveyor and adjustable hopper gate.

In the 2-section peeler—Point 1 on flowsheet—potatoes are heated in 140 F. water, then immersed in a caustic solution. Variety and condition of tubers determines product flowrate, and temperature and concentration of the caustic solution. Flow is controlled by variable-speed paddle-wheels. Concentration of caustic may be varied from 10 to 20%, temperature from 190 to 210 F.

Peel removal is completed in a rotary washer, employing high-pressure water jets and abrasive action. Then comes trimming-sorting and automatic size-grading. Each size is conveyed to proper processing lines.

For production of potato granules, a screw-conveyor provides steady flow of water-submerged, peeled tubers from a storage hopper to the slicers. They are cut in ¾ in. slices, spread on a wire-mesh belt, and moved through the atmospheric steam cooker.

Cooked potatoes are cooled by "steam-off" to 140 F. as they are elevated to the drum-type mashing rolls—Point 2. Crushed product is skimmed from rolls by doctor knives, then is screw-conveyed to ribbon mixers.

For the story behind Simplot's high-performance installations, see this month's special feature article, "How to Unit-Engineer a Line Operation"—on page 86.

A metering scale, actuated by the rolls, feeds previously dried potato granules ("seed") into this flow, adjusting the overall moisture content to 35-38%.

The three critical mixing operations, done under accurate controls, are arranged to discharge progressively from one to the next. Then a swivel-conveyor carries mash to moisture-equalizing bins.

Equalized product is conveyed to an air-lift dryer. Riding a cushion of air, granules are recirculated through dryer until, at about 12-14% moisture, they are discharged to a cyclone collector.

From here, granules move to sifter—Point 5—that separates flow in three fractions—stock feed, addback seed, and fine granules to be further dried as finished product. Seed fraction is initially dried in a bone dryer, then chuted back to a supply hopper to be added to incoming mash.

Fine fraction is drawn from the sifter to a series of two bone dryers that reduce moisture to 10%. From the last unit, granules chute to a fluidized bed-dryer, developed by company engineers and WRUB (Albany, Calif.). Unit comprises a rectangular trough. Separated midway by a porous refractory floor of carborundum, the lower section forms a plenum chamber into which heated air is pumped. Product flows over porous floor and, at the exit, overflows a weir into the cooling section, which uses 70-F. air and a water-cooled coil of copper tubing.

Frozen Products

For French fries, water-stored potatoes are again screw-conveyed—first, to strip-cutters and then to a shaker-grader—Point 7. Slivers and "shorts" travel to dicing.

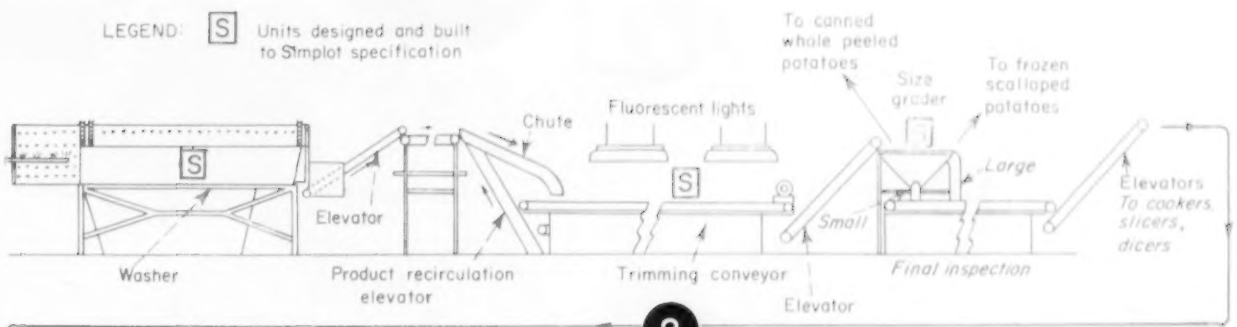
Size-graded strips are steam-blanched at 205 F., and, following dewatering, are elevated to a dryer composed of a series of staggered, wire-mesh belts. Strips enter the upper level and drop progressively to lower belts, which finally feed them to fryers. A 20,000-cfm blast of 230-F. air, blown through steam radiators by four fans, dries surfaces of strips. Two stainless steel fryers, in tandem, are company designed and fabricated. Each is equipped with a shell-and-tube oil heater and blower system to exhaust water and oil vapors.

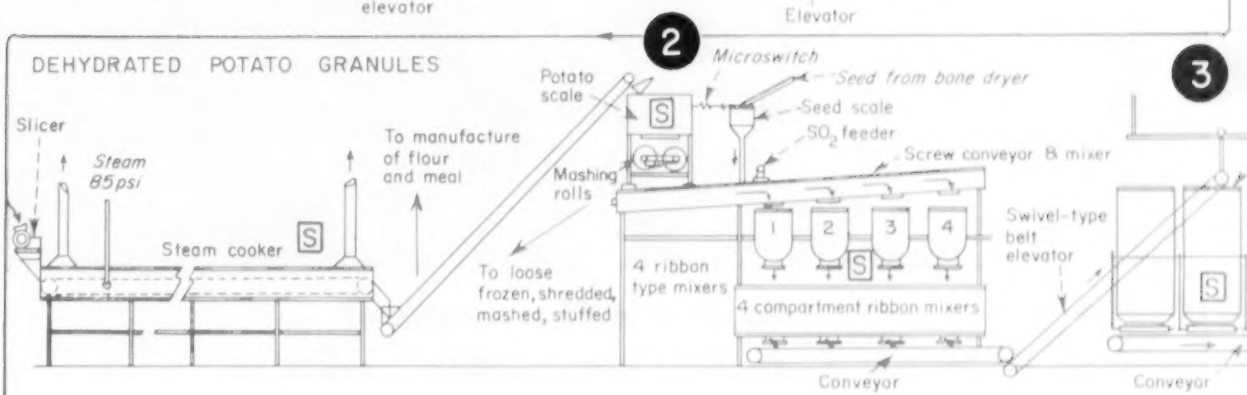
An oscillating, stainless screen conveys strips through each fryer successively. Then they move through the defatter on a vibrating screen while excess oil is removed by a 315-F. wind-blast.

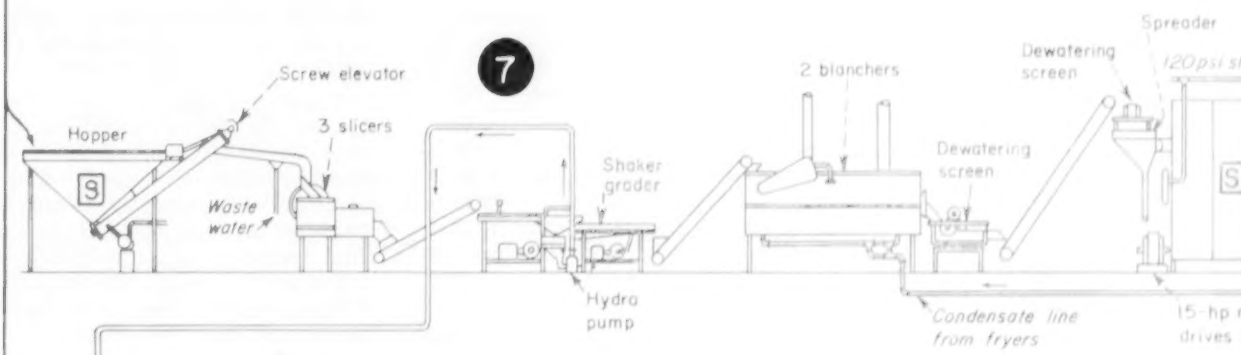
At this point, temperature of strips is about 150-F., but it is quickly reduced to 90-F. in an enclosed cooler. Cooled potatoes are conveyed to a freezing tunnel, frozen, then packaged.

The fraction of raw material separated at the strip-grader and whole potatoes, too, when necessary, are hydro-conveyed to dicers, from where material moves to either a blancher and freezing tunnel for the hashbrown product, or to another blancher and hopper feeding dehydration trays. Filled trays are automatically stacked on cars—Point 11. And cars are moved into conventional counter-flow tunnels for dehydrated diced product.

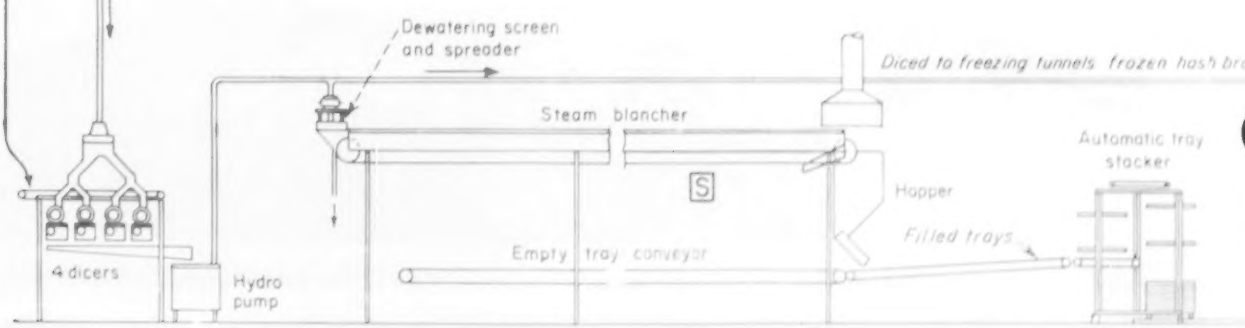
P R E P A R A T I O N

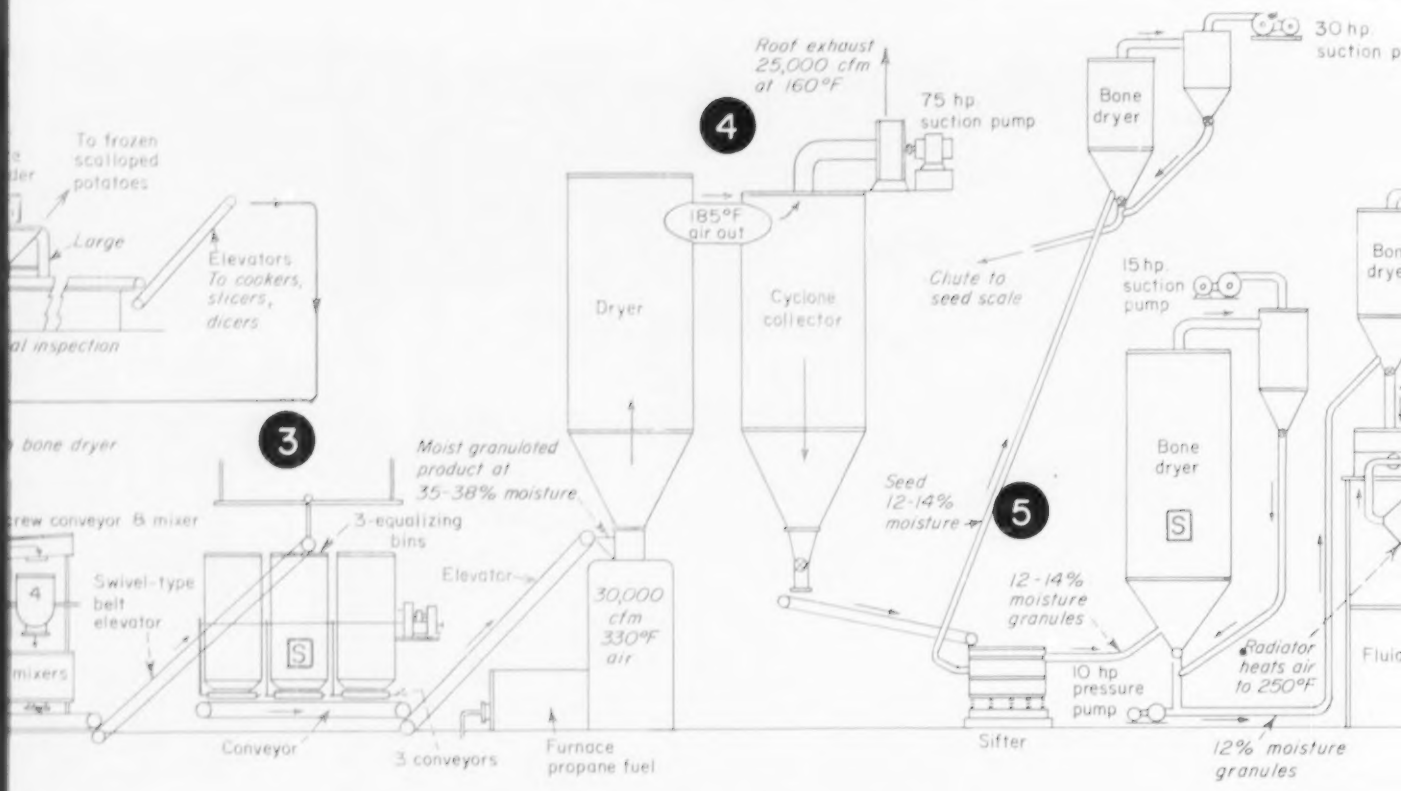


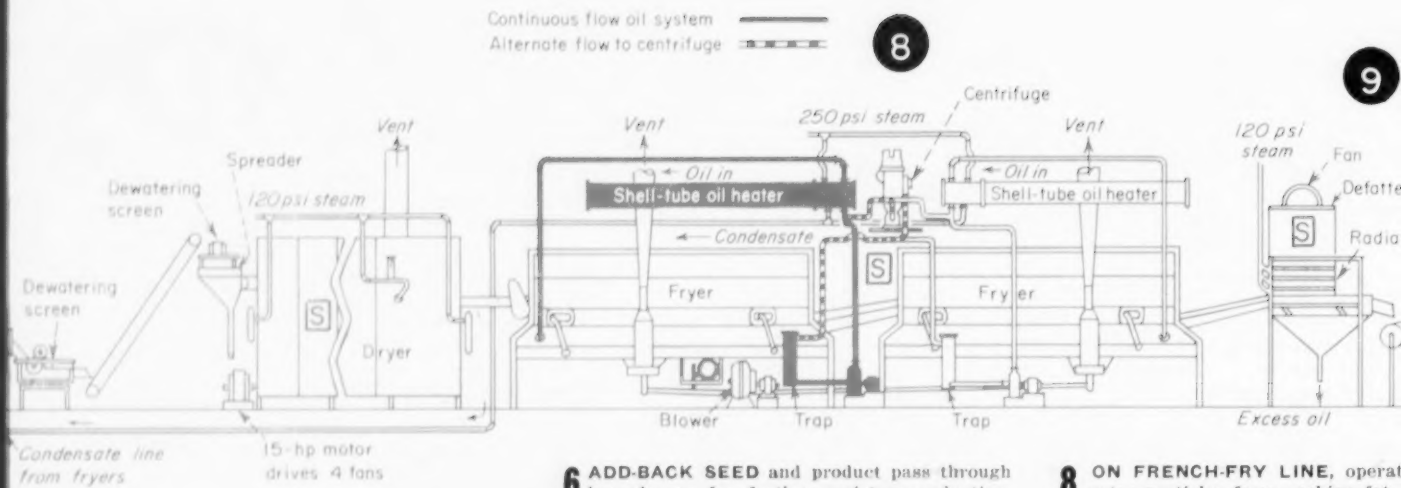




F E PICTURE FLOWSHEET NO.



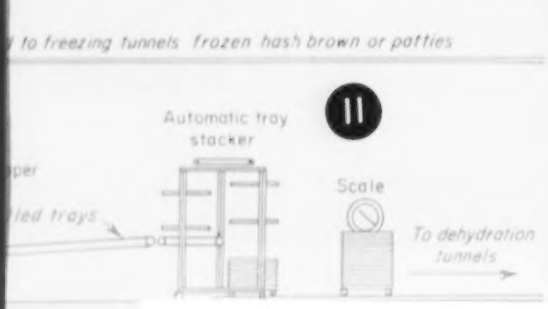


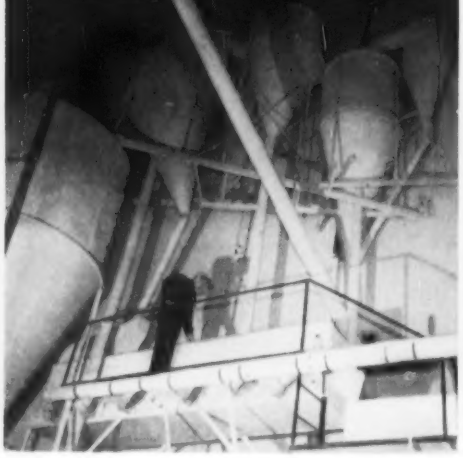


6 **ADD-BACK SEED** and product pass through bone-dryers for further moisture reduction, then chute to fluidized bed-dryer.

8 **ON FRENCH-FRY LINE,** operat rates particles from cooking fat. exchanger (top). Eccentric arms, on

F E PICTURE FLOWSHEET NO. 76





pump

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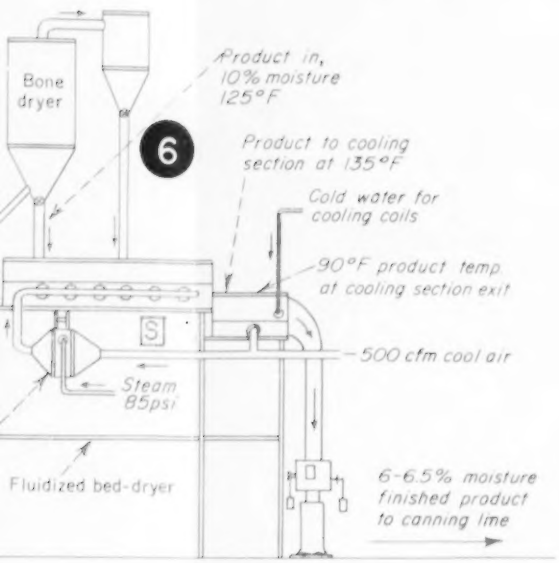
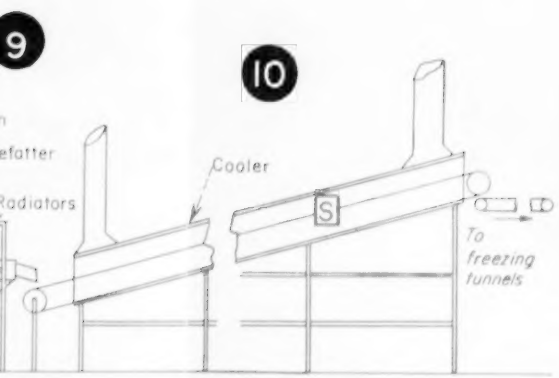
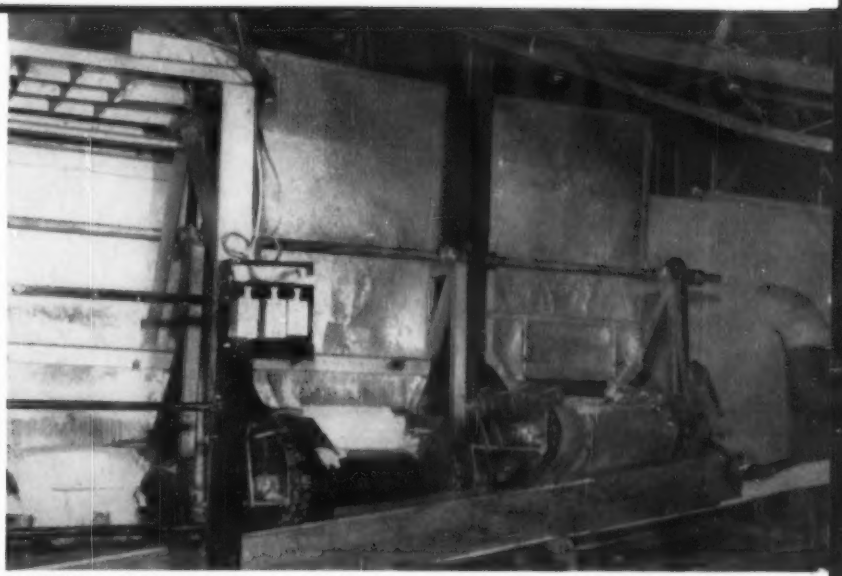
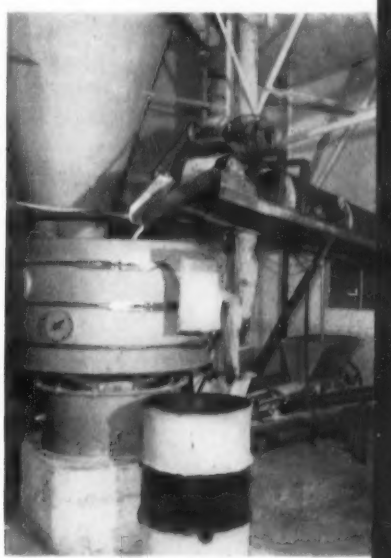

Bone dryer
6
Product in, 10% moisture 125°F
Product to cooling section at 135°F
Cold water for cooling coils
90°F product temp. at cooling section exit
500 cfm cool air
Steam 85psi
Fluidized bed-dryer
6-6.5% moisture finished product to canning line





3 **SWIVEL-ELEVATOR** (upper right) can fill all three moisture-equalizing bins. Hopper bottoms are belts that feed product to transverse belt.

4 **MOIST PRODUCT** is elevated to air-lift dryer that discharges into cyclone collector (seen left).

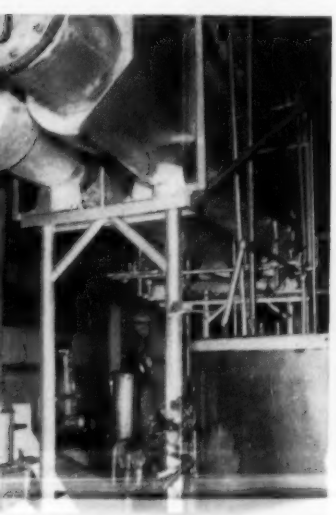


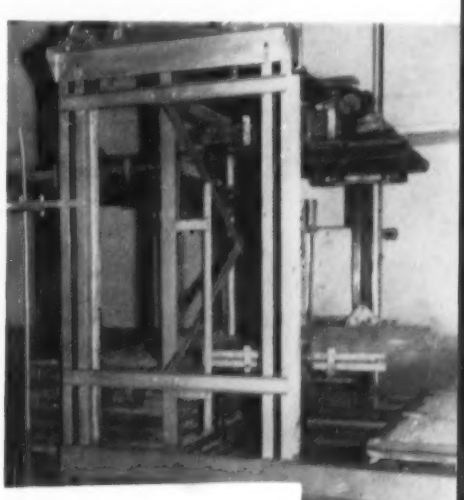
5 **SIFTER'S** 14- and 60-mesh screens divide potato granules into three fractions.

perator checks oil-trap that separa- fat. Oil then passes through heat , on side of cooker, actuate screen.

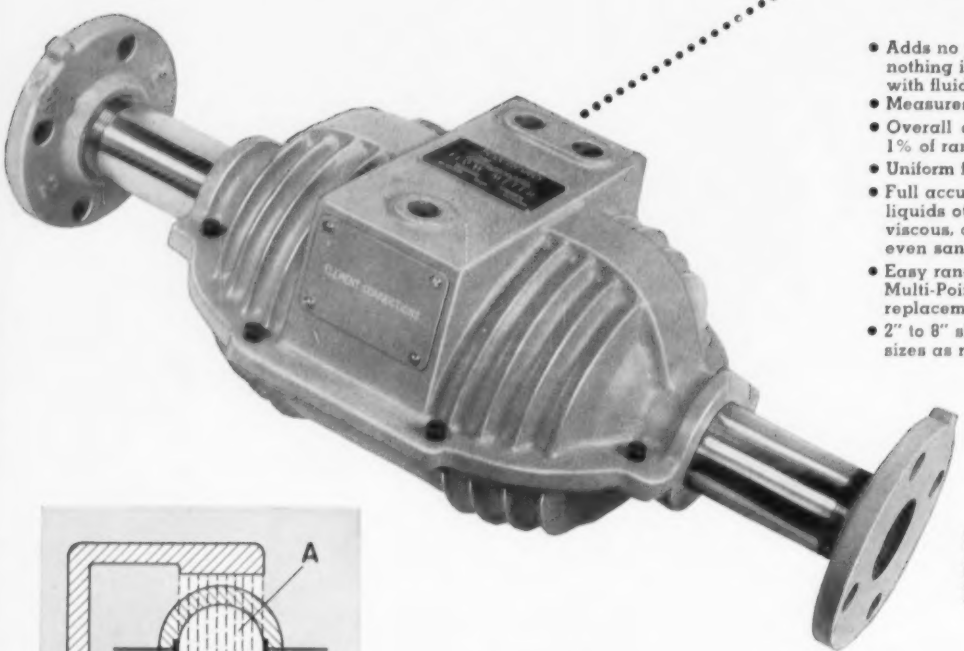
9 **EXCESS OIL** is removed from strips in multi-level defatter by heated wind-blast. Strips are then conveyed to cooler (right) before being frozen.

11 **TRAY-STACKER** places blanched, trayed, diced potatoes on cars that run on rails to tunnel dehydrators.



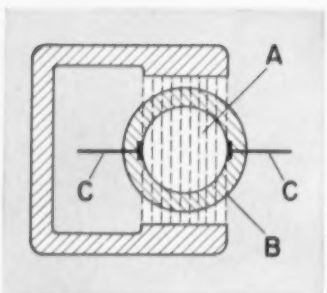


NEW! a flow meter with no flow restrictions!



- Adds no pressure drop — nothing inside pipe to interfere with fluid flow.
- Measures fluid velocity directly.
- Overall accuracy better than 1% of range over entire scale.
- Uniform flow scale.
- Full accuracy sustained even on liquids other meters can't handle: viscous, corrosive, or pulpy — even sand-water slurries.
- Easy range change — either by Multi-Point Switch or range coil replacement, as preferred.
- 2" to 8" sizes standard — larger sizes as required.

FOXBORO MAGNETIC FLOW METER



SIMPLE, TROUBLEFREE, OPERATION

The Foxboro Magnetic Flow Meter operates on the same principle as a power generator. A magnetic field (A) is maintained through a standard pipe section (B) of stainless steel or other non-magnetic material. This pipe section is lined with Kel-F® or other insulating material. Liquid passing through pipe acts as moving conductor, generating an electric voltage which varies in proportion to liquid's average velocity. Flush electrodes (C) in pipe wall "pick up" this voltage which is recorded in desired flow units by Dynalog Electronic Recorder or Controller.

This premium-performance meter measures *magnetically* the flow rate of virtually any liquid except hydrocarbons. It completely ignores such common metering headaches as turbulence, suspended solids, and variations in conductivity, density, and viscosity. It even measures reversing flows.

Installation is simple. The magnetic spool piece connects into the line like any equivalent length of pipe — no seals, purges, meter runs, or straightening vanes required. Connects by 2-conductor cable to remote Dynalog Electronic Flow Recorder.

Maintenance is practically eliminated. There are no pressure taps to become plugged or frozen, no working parts to foul.

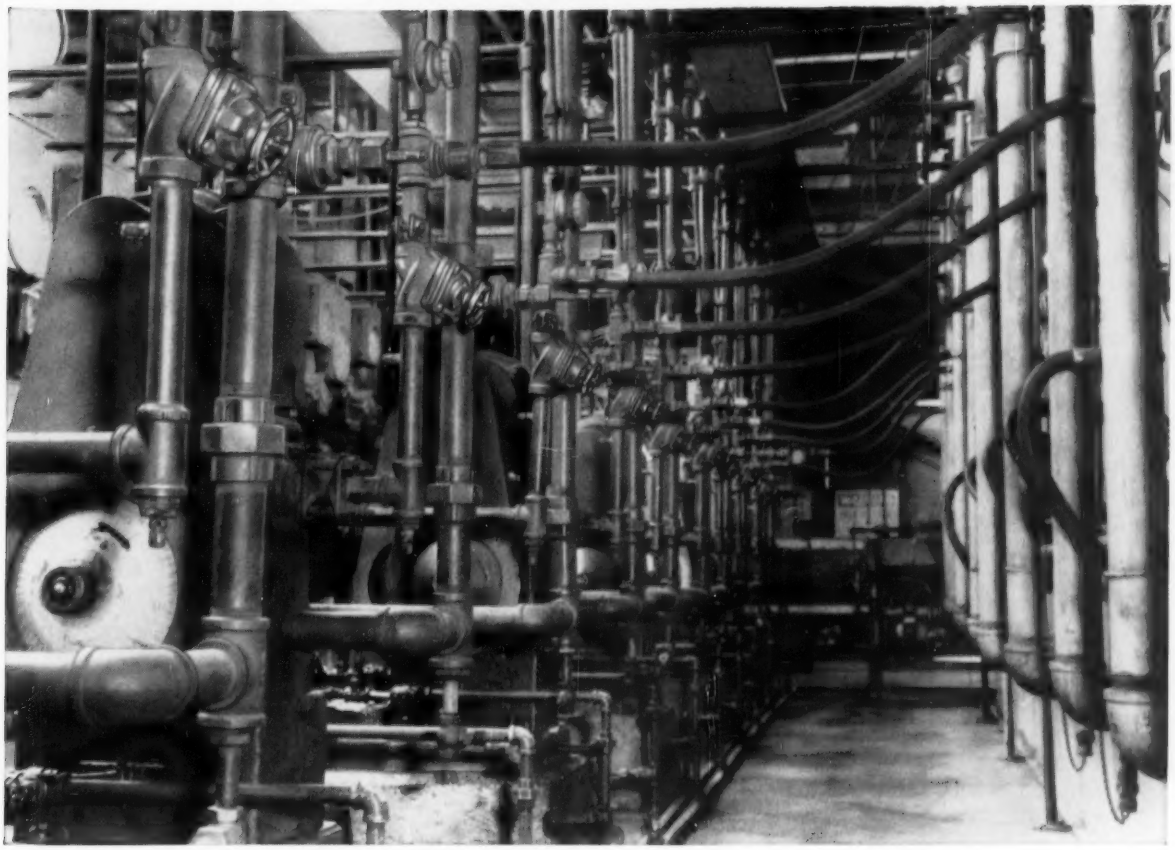
Foxboro Magnetic Flow Meters are already in use on such widely different liquids as beer, sand-and-water, rosin size, rock-and-acid slurry, viscose, and highly corrosive liquid detergent. Find out how this precise, troublefree flow meter can help *your* processing. Write for complete details.

THE FOXBORO COMPANY, 305 NEPONSET AVENUE, FOXBORO, MASS., U. S. A.

FOXBORO
REG. U. S. PAT. OFF.

Foremost in FLOW METERING

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND



Holding high vacuum with low upkeep is routine for these CRANE VALVES

At the Crosley & Bendix Home Appliance Divs. Avco Mfg. Corp. refrigerator plant at Richmond, Ind., a line vacuum within a few microns of absolute is applied to a dehydration process. But holding this vacuum wasn't always a routine operation. There was a time when frequent valve failures caused production losses and costly maintenance—stopped only when Crane Packless Diaphragm Valves were installed.

Of the valves formerly used, a multiple metal diaphragm type lasted about 3 months. Crowning of diaphragms caused restriction or closure and made the valves inoperable. Damaged diaphragms meant complete valve replacements. In other valves, in-leakage at the diaphragm-to-stem connection made them unsatisfactory.

Now in service more than a year, none of the Crane Kel-F Diaphragm Valves have needed any maintenance. Their simplified construction, giving a longer-life diaphragm . . . tighter bonnet seal and seating . . . and easier operation . . . is the reason. And that's typical of Crane quality . . . always the bigger value for thrifty buyers of valves and fittings. General Offices: 836 S. Michigan Ave., Chicago 5, Ill. Branches and Wholesalers Serving All Industrial Areas.

CRANE NO. 1610KF PACKLESS DIAPHRAGM VALVES

The diaphragm in Crane design has longer life because it seals the bonnet only—is not subject to the cutting and crushing encountered when also used for seating. Makes a tighter bonnet seal—while separate, positive seating disc controls fluid even should diaphragm fail. Wide selection of body materials and trims. Write for circular AD-1942 or get it from your Crane Representative.

CRANE CO.

VALVES • FITTINGS • PIPE
KITCHENS • PLUMBING • HEATING

CRANE'S FIRST CENTURY...1855-1955

For more information, use coupon on last page.

T. J. Salo, Jewel Tea Co., Inc. (left), and B. J. Toale, Standard Oil automotive engineer, discuss lubrication. Barney Toale has been providing lubrication engineering service to accounts like Jewel for 18 years. Barney received his engineering training at the University of Wisconsin, has completed Standard Oil Automotive Engineering School. Customers find this experience and training pay off for them.

Moves a million pounds of produce every night . . . relies on

STANOLUBE HD-M *Motor Oil*

IN CHICAGOLAND, Jewel Food Stores moves a million pounds of produce and bread by truck from warehouse to retail market every night, six nights a week. There's no room in such a schedule for lubrication failure. So Jewel relies on a dependable motor oil—STANOLUBE HD-M.

The high quality base stock of STANOLUBE HD-M teamed with additives that are exclusive Standard Oil developments, give STANOLUBE HD-M ideal properties for the kind of service required of it by Jewel Tea Co.

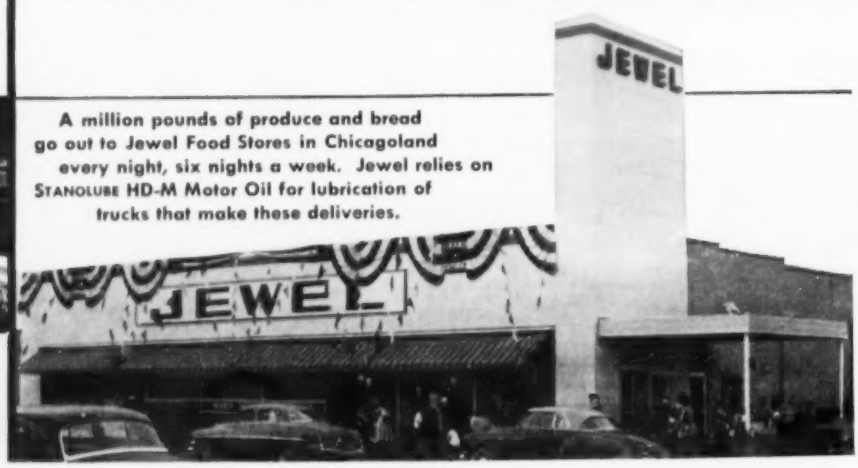
STANOLUBE HD-M reduces hot engine deposits. In addition it keeps valve stems free of deposits because of its excellent detergent-dispersant qualities. And STANOLUBE HD-M overcomes the sludging experienced with ordinary oil when unstable fuels are used.

These properties of STANOLUBE HD-M are helping Jewel Tea deliver on schedule in all kinds of weather, under an almost infinite range of driver handling. It can do the same for you. Find out. In the Midwest call your nearby Standard Oil office. Or contact, Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD

STANDARD OIL COMPANY
(Indiana)

A million pounds of produce and bread go out to Jewel Food Stores in Chicagoland every night, six nights a week. Jewel relies on STANOLUBE HD-M Motor Oil for lubrication of trucks that make these deliveries.



FINANCIAL AID TO HIGHER EDUCATION

Business Help for Our Colleges A Job for All Business Firms

IN recent months, individual business firms have announced the adoption of a variety of plans, both imposing and ingenious, for financial aid to higher education in the United States. In doing so, they have taken a lead in dealing with a problem of transcendent importance both to the business community and to our nation as a whole.

Previous editorials in this special series have shown that:

1. Our colleges and universities, and particularly the independent, privately endowed institutions, are in grave financial difficulties.

2. These difficulties promise to become much more acute in the years immediately ahead unless extraordinary steps are taken to relieve them.

3. A financially crippled system of higher education is a major national menace.

If, however, the business community is to play an adequate part in helping our colleges and universities financially, the plans adopted by business firms thus far constitute merely a beginning and a set of guide posts. What is required is a general movement on the part of business firms to go to the financial aid of higher education. Such a movement would involve a myriad of individual company plans which, in the nature of the case, cannot be expected to bring great renown or publicity to their sponsors.

Rescue Operation Is Feasible

For the business community as a whole it is feasible to make a major and possibly a decisive contribution to putting our colleges and universities back on their feet financially. One percent of business profits before taxes would do it. In 1954 business profits before taxes were about $35 billion. If one percent of these profits, or $350 million, were contributed to our independent, privately endowed colleges and universities it would enable these institutions (1) to increase the salaries they pay by $200 million a year, and (2) to provide $150 million more for modernization and maintenance of their establishments. In the opinion of competent authorities, this would put these institutions in relatively good working order financially, a process to which a matching grant of $50 million by the Ford Foundation for the improvement of faculty salaries will make a large contribution. It would add about one-fourth to their present annual outlay of about $1.4 billion.

Such a contribution from business would not meet the needs of the independent institutions for new buildings and equipment required to accommodate the great increase in college enrollment anticipated in the years immediately ahead. Neither would it relieve the financial problems of our tax-supported colleges and universities. As a group these institutions have fared better financially in recent years than the

independent institutions. But they also face grave financial problems, particularly in the provision of adequate faculty salaries. It would be far simpler, however, to solve the financial problems of the tax-supported institutions if the independent colleges and universities were back on their feet financially.

One Dollar Does Work of Two

The federal government exempts 5 percent of business profits from the tax imposed upon them if the 5 percent is devoted to religious, charitable or educational purposes. (Most profits are taxed 52 percent.) A contribution of one percent of business profits to higher educational institutions would exhaust only one-fifth of this allowance. It would bring to about two percent the total share of business profits going to both educational and charitable purposes.

In 1953, business firms contributed about $400 million, or slightly more than one percent of profits before taxes to educational and charitable purposes of all kinds. Of this total about $75 million went to educational institutions, mostly colleges and universities.

For some companies it is feasible to contribute more than the average contributed by business generally. Indeed, some companies not only utilize their full 5 percent of tax-deductible funds for charitable and educational purposes but go beyond it. For other companies in financial difficulties no contribution at all is possible.

If, however, those business firms for which it is financially feasible contributed one percent of their profits before taxes to our colleges and universities, the problem of adequate support for the crucially important business of higher education would be far along the way to successful solution. **In 1954 a contribution of one percent of their profits before taxes, or about $350 million, would have reduced business profits after taxes by only about half that amount. This would have meant a reduction of about $175 million, out of a total of about $17.8 billion of profits after taxes.**

Attractive plans to channel financial aid from business to higher education have been abundantly demonstrated recently. These plans, for the most part the creation of large corporations, have included not only a broad array of scholarship grants, but such ingenious arrangements as that by which a company matches with its funds the gifts its employees make to the colleges of which they are alumni.

A full array of these plans, some of which were discussed in an earlier editorial in this series, has been prepared by The Council for Financial Aid to Education (6 East 45th Street, New York City 17) and is available for the asking. Also, colleges and universities have established in most states and regions cooperative associations to help business help them. The Commision on Colleges and Industry (912 Kahn Building, Indianapolis 4, Indiana) distributes a directory of these associations. And, of course, the colleges themselves are always eager to discuss their financial problems with business people and suggest constructive solutions.

Only Small Start Made

The plans for business aid to education which have recently attracted national attention constitute the conspicuous sort of leadership which it is the privilege and opportunity of our great corporations to provide. But the job is too large to be handled by a small number of business firms, no matter how bold or ingenious their programs.

To put our colleges and universities back on a firm footing financially the help of the great rank and file of business corporations is required. All of them, large and small, have a crucial stake in seeing that this job is done. The future of America will be decisively shaped by what happens in and to our college classrooms.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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Donald C McGraw

PRESIDENT

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are you selling the diet-shopper?

Many dieters can't (or won't) use sugar-sweetened products!

They know SUCARYL—*they've used it in their homes.*

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Dieters have appetites, too! And when they can get *sweetness without calories* in their controlled diets, they're quick about buying. Even paying a little more if they have to.

Here is a market perfectly primed for your new SUCARYL-sweetened line. For SUCARYL offers clean, sugar-like sweetness—without the bitterness or clinging sharp taste of other synthetic sweeteners.

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Stop the diet shopper with Sucaryl®

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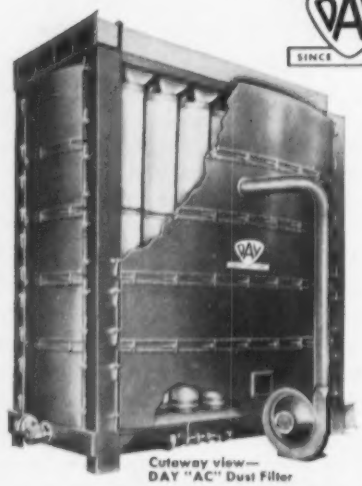
50 Years have changed a lot of things!

...including DUST CONTROL



Cutaway view—
DAY "AC" Dust Filter

KELLOGG'S MODERNIZATION PROGRAM INCLUDED DAY DUST CONTROL

The DAY Company engineered, manufactured and installed modern dust control at Kellogg's large Battle Creek plant. The "heart" of these systems is the DAY "AC" Filter. Bulletin 528-R explains in detail why so many well-known companies choose DAY Dust Filters. Write toDAY for your copy.

Man's accomplishments in all fields in the past 50 years are nothing short of spectacular. Compare the 12 second flight by the Wright Brothers in 1903 with the 3 hour and 46 minute *non-stop* transcontinental flight made March 9th, 1955. Striking progress in dust control equipment has also been made. When measured against the modern DAY High Pressure Reverse Jet Dust Filter, "rapping" or "shaking" type filters are simply out-of-date.

The DAY "AC" Dust Filter, made under DAY and Hersey patents, is the *modern* filter to match *modern* methods. It handles up to *five* times more dust laden air per square foot of cloth area than out-moded conventional type filters. At the same time this modern DAY Filter requires one-third less plant space.

DAY "AC" filter tubes are cleaned *automatically* and *continuously*. Self-adjusting cleaning rings clean the filter tubes and dislodge trapped dust, using high pressure reverse jet air. This cleaning method improves filtering effectiveness and lengthens filter tube life.

EVIDENCE OF DAY "AC" DUST FILTER EFFICIENCY is proven by the fact that 87% of our filter production is for reorders from users. For detailed information about the modern DAY "AC" Dust Filter write toDAY for your copy of Bulletin 528-R.

The DAY *Company*

817 Third Avenue N. E., Minneapolis 13, Minnesota

IN CANADA: P. O. Box 70D, Fort William, Ontario
Branch Plants: Buffalo, Fort Worth and Toronto, Ontario
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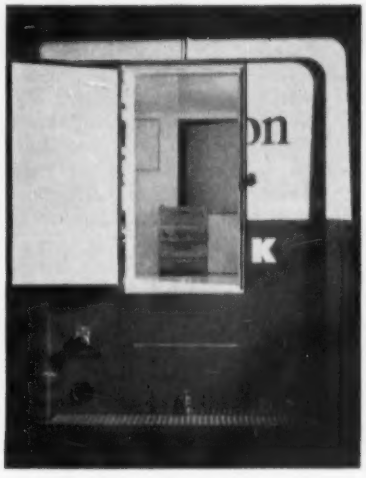
STOP AIR POLLUTION with DAY DUST CONTROL

NEW EQUIPMENT & SUPPLIES

Trim, Economic Design Features . . .



. . . Ultra-Sanitary Interior

All-Plastic Truck Body Offers Many Advantages

Advanced sanitary features and lower maintenance costs are significant food-industry advantages that are spurring interest in a new all-plastic truck body.

Unit is made of a reinforced fiberglass laminate (Lamicor) by molding the sirup-like plastic base, and heat-curing for about 5 min. Although this material is relatively expensive costs are cut in assembling the body, which consists only of two halves joined by a neoprene gasket.

Structural framing is molded into the outer skin rather than being joined to it by conventional riveting or welding mothods. Therefore, there are fewer joints to come loose and require repair. This construction also eliminates plywood liners (which warp and rot), and permits increased interior dimensions for greater payload. Replaced too are thin metal liners which have little impact resistance and are quickly dented in service.

Shown above is a brightly colored red and white truck designed for retail milk delivery. Foor, roof, sides, and interior lining are made of this plastic, and the body is mounted on a Ford chassis. Vehicle has 3 in. of floor insulation, 4 in. on the sides. Plate-type refrigeration with flexible connection to compressor (housed in rear compartment) provides the required low temperature.

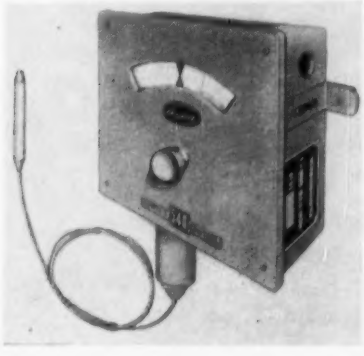
Several unique properties of the plastic are responsible for advantages cited. Resistance to moisture, common chemicals, and odor absorption reportedly is excellent. Steam may be used in cleaning since the plastic is unaffected by changes in temperature. And the truck's sanitary construction simplifies the task.

Minor body repairs are easily made by filling dents with plastic material (maker supplies a kit). In more serious cases, whole sections may be cut away and replaced with spare parts. Standard woodworking tools can be used but cutting tools lose their edge somewhat sooner.

Another important maintenance factor is elimination of painting since color can be incorporated into the plastic base. Lettering and attractive displays may also be included. Red, yellow, black, and green are stable to weathering while white tends to yellow in time. If desired, surfaces may be painted after the adhering mold release compound is removed.

Structural properties of the plastic permit this truck to be made 10-15% lighter than its metal counterpart. Result is more economical operation—savings in fuel, lubricants, and tire wear.—*Strick Co., Whitaker Ave. at Godfrey, Philadelphia 24.*

Circle 129A on Reader Service Card



Temperature Controller Is Accurate, Compact

Low-cost temperature control is offered by this indicating unit (Series 540), which reportedly has an accuracy of 1% of full scale in normal operations (3% under severe conditions). Recommended applications include packaging and processing equipment, and ovens.

Instrument may be flush or surface mounted and has an operating range of 100 to 700 F. with uniform sensitivity throughout the range. Principal feature of the unit:

1. Double-pole, double-throw power relay rated for 15 amp., 115v., and integral with the case. One pole is used for external connections, the other may be used in holding circuit. Space is also provided in case for adding another relay to control warm-up heaters, or to increase rating or number of available poles for load carrying.

2. Adjustable differential that can be varied between 0.8 and 4% of scale range. This permits unit's oper-

ating bandwidth to be adjusted for lower equipment cycling rate, and thus longer equipment life when a larger control bandwidth is acceptable. Slower cycling rate usually is desirable when controller operates expensive heavy-duty contactors.

3. Temperature setting and bulb temperature pointers pivot on same axis and indicate against same scale face. Therefore, it is possible to compare actual with set-point temperature from a distance.

4. Compartment containing instrument mechanism is gasketed for dust sealing. Terminal connections for external circuit are housed inside the case, but separate from mechanism.

Unit operates on a liquid-filled bulb and capillary system. Response to temperature change is transmitted to a bellows assembly and then to the indicating pointer through a simple mechanical linkage. Backlash is eliminated at all linkage points by spring-loading the final lever element to keep all bearings tightened.

Control temperature is set with an adjusting knob on front of instrument panel. Control set-point establishes temperature at which heater circuits are turned on. Latter are turned off at some higher temperature, depending on desired span.

Bellows assembly is self-compensating for changes in ambient temperature in 50 to 150 F. range. And entire unit may be exposed to −65 F. indefinitely without damage. Capillary tubes are available in standard lengths of 6 and 10 ft. Temperature-sensitive bulb is 5⅛ in. long and ¾ in. dia., but other configurations can be obtained. Case is about 6¾ in. square and 2¾ in. deep.—*Fenwal Inc., Ashland, Mass.*

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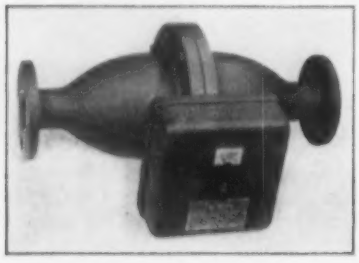

Boiler Scale Controlled By Non-Chemical Unit

Use of water softeners or chemicals to control hard water scale in boilers or process equipment is said to be eliminated with use of a new device, called Hydrotron.

This refers to a non-chemical process that changes the manner in which minerals are precipitated from water solutions. Instead of minerals depositing on heat exchange surfaces as a hard, cement-like coating, this treatment reportedly causes them to form as a fine, loose sludge or slurry that can be removed by normal blowdown procedure.

System is termed especially adaptable to water treatment for boilers making steam to be used in food plants, or in other processing where there is danger of contaminating the product with boiler chemicals. And another application is in treating once-through cooling systems where cost of chemicals is prohibitive.

Installation is simple and can be made by maintenance personnel. Entire apparatus is of sturdy construction and requires a minimum of attention in operation. Furthermore, there are no anodes or parts to wear out, and operating cost is said to be low.

Company's service includes periodic internal boiler water analyses and reports to the user during first year of operation.—*Heller Laboratories, 124 Fort Lee Road, Leonia, N. J.*

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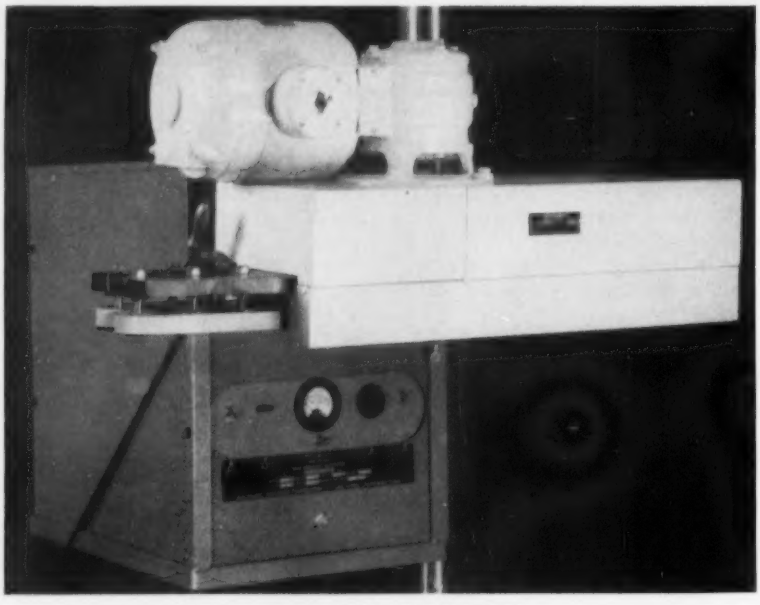

Continuous Welder Seals Plastic-Bag Tops

Need for a high-speed closure apparatus—capable of integration into packaging lines or coordination with automatic filling equipment—reportedly is met by a new, continuous electronic bag-top welder, designated as Model 525.

Bag speeds range from 30 to 60 ft. per min., and welding power from the associated high-frequency generator is termed easily controlled. Welding mechanism is carried on a column which provides height adjustment within a 24-in. range. And supporting the welder on a tilting head permits orientation from the horizontal to a 36-deg. angle away from the column.

Filled open-top bag is fed either automatically or by hand into one end of the welder, where it is gripped by moving belts and carried through the unit. Bag is positioned between a continuous over-riding buffer strip and continuously firing high-frequency electrodes, which provide a uniform seal across the top of a bag of any width.

Use of the over-riding buffer and design of the forming pressure rollers, prevent contact between plastic bag and electrodes. This obviates sticking and eliminates wrinkling. It also provides for accurate holding of bag edges before and during welding, as well as throughout the controlled cooling period during which the bag continues its forward motion.

Unit weighs 220 lb., and is 35 in. long x 33 in. wide x 60 in. high.—*Electronic Processes Corp., 1094 San Antonio Rd., Los Altos, Calif.*

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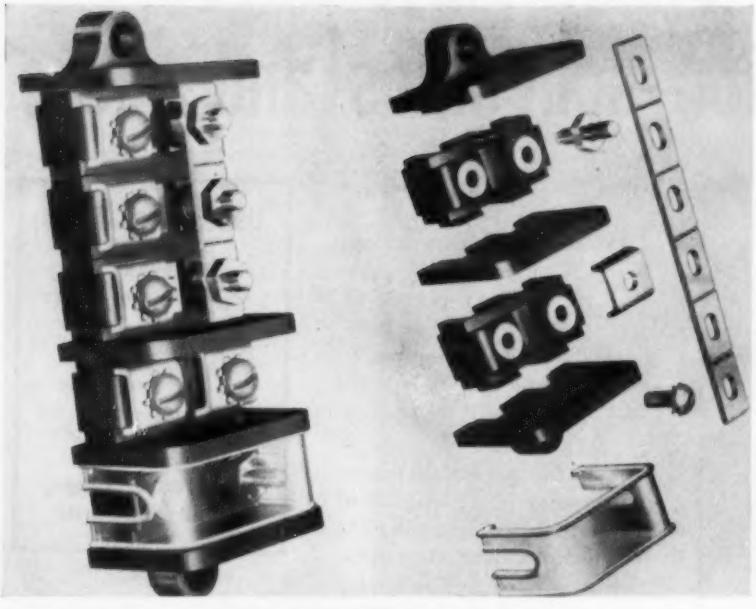

Terminal Blocks Are Easily Hand-Assembled

A new type of sectionalized, hand-assembled terminal block is designed to provide a variety of quickly-assembled terminal combinations with only five major interchangeable parts to be stocked.

Units (AlphaBlocks, Series N) offer from 1 to 100 or more terminal pairs with or without insulating barriers, and can be made from a small box of parts. Any combination of single circuits and distribution strips reportedly can be constructed on the spot, without need of special blocks or space-consuming separated strips. And no mounting rails, fasteners, or special tools are needed to assemble these terminal blocks.

Dovetail lugs and slots for joining units are located in the base of terminal blocks, insulating barriers, and end pieces to give automatic self-alignment and strong mechanical connection upon assembly. Slots are tapered slightly to provide a light press fit between units. Clear plastic insulating covers snap over blocks and fit snugly between the insulating barriers.

When units are mounted on panels by means of bolts or screws through end pieces, they neither come apart nor can they be rearranged without removal from panel. Unmounted units can readily be assembled or disassembled by hand, without tools, and covers can be installed or removed at any time.

Standard terminal blocks are furnished with tapped bronze inserts, either with or without internal electrical linkage between pairs. And where specified, bronze stud screws are available. These #10-32 stud screws are machined with an integral hex nut and special end cavity which, when screwed into the tapped holes, jam in place to form a permanent terminal post.

If blocks are to be used as distribution strips, insulation barriers are left off, and a copper bus bar strip is dropped over one side of the block pairs. Bars are drilled at proper intervals and are furnished in pieces capable of accommodating 16 blocks each. Scoring between post slots permits breaking off desired lengths by hand.

Identification of circuits is accomplished with a small tag which fits securely between terminal pairs in a dovetail slot. Blocks are rated at 50 amp. and 750v., and a larger series will be made available in the near future.

Mounted dimensions: Blocks, 1½ in. wide, ⅝ in. long, ⅝ in. high; barriers, 1¾-in. wide, $\frac{5}{32}$ in. long, 1¼ in. high; ends, 1¾ in. wide, ⅝ in. long, 1¼ in. high. Addition of unit lengths gives the installed length of any block. Thus, a 5-pair unit with insulating barriers is 5⅜ in. long, and without barriers 4⅜ in. long. Accessory hardware for various wire sizes and types is also available. — *Alpha Electrical Products Co., P. O. Box 202, Little Rock, Ark.*

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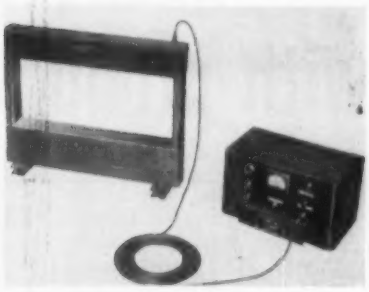


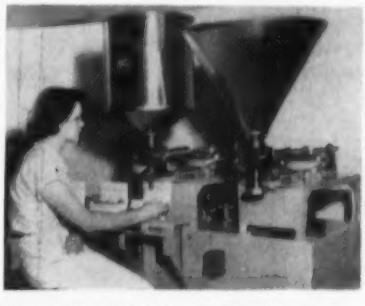
Metal Detector Guards Product Quality

This low cost metal detector is designed to signal the presence of all magnetic metals instantly and automatically—thereby protecting product quality and equipment from damage by tramp metal. And detectors sensitive to minute particles of non-magnetic metals are also available.

New Universal Series unit is simple in design, installation, and operation. Further, it requires no attention. Device is merely plugged into any single-phase outlet and the search coil is placed around conveyor belt. Turning switch on puts unit in operation and intensity may be adjusted to overlook non-magetic belt lacings.

Small compact control cabinet weighs only 24 lb., and contains standard type tubes. — *Dings Electronics, Inc., 4740 W. Electric Ave., Milwaukee 46.*

Circle 131B on Reader Service Card



Compact Filler Handles Liquids, Semi-Solids

A number of Mexican foods—from tamales to refried beans—are filled into bottles, jars, or cans with this small, compact machine.

Versatile unit handles both liquids and semi-solids at rates ranging from 15 to 30 containers per min. And it is adjustable to deliver from 1 to 32 oz. of product.—*F. L. Burt Co., 571 7th St., San Francisco.*

Circle 131C on Reader Service Card

Misused steam plays havoc with production schedules and costs

Mojonnier Plays Safe— Installs Sarco FT Traps On Its Vacuum Pans

The Mojonnier Vacuum Pan is used to condense liquid foods. To obtain maximum heat transfer, steam coils must be kept free of condensate, air and gases.

Mojonnier assures the efficiency of its vacuum pans by installing Sarco Float-Thermostatic Traps. This is the only type of trap which discharges condensate *as it forms* thus assuring maximum temperature across the coils. Built-in thermostatic air vent discharges air and gases continuously – both at start up and *during* operation.

The Sarco FT Trap is only *one of 5 different types* which Sarco makes to fill all the trapping needs of the food processing industry.

Sarco Float-Thermostatic Trap

Offers instant removal of condensate plus continuous operation without shock or disturbance of temperature. Available in large sizes and very large capacities.

Use Steam Right

1. To prevent production delays
2. To improve product quality
3. To maintain desired output
4. To reduce labor and steam costs

IN YOUR processing operations, are you up against troubles such as slow-ups, uneven or inadequate heating, poor temperature control—resulting in reduced output, lowered product quality and increased costs?

You may suspect that your equipment is at fault. But process heating headaches often are due to ineffective utilization of steam. The wrong type trap can cause condensate to waterlog equipment. Improper air-venting can reduce the rate of heat transfer by as much as 11%. Manual temperature control may prove erratic, affect product quality, increase production costs.

If your plant is suffering from any of these production handicaps, Sarco can help you. Sarco has a wealth of practical experience in the process industries to put to work for you. Plant after plant, with Sarco help, has licked these problems through simple, inexpensive changes. The results have been: increased output, improved product quality uniformly maintained, lower production costs.

Engineering Service: Our engineering service is yours for the asking. Call our local representative, or, write today for case histories describing how other plants in your field have solved similar problems through the proper application of steam traps and inexpensive temperature controls. Sarco Company, Inc., Empire State Bldg., New York 1, N. Y.

SARCO

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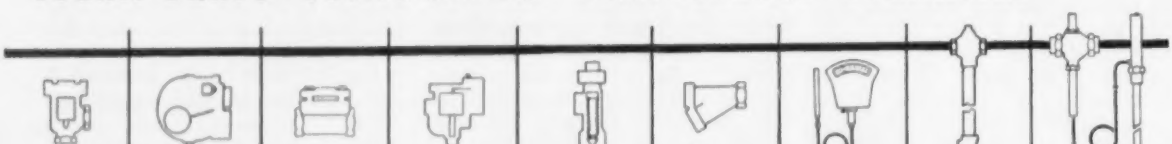
2021-B

STEAM TRAPS • TEMPERATURE CONTROLLERS • STRAINERS



Thermostatic Steam Traps | Float-Thermostatic Steam Traps | Thermodynamic Steam Traps | Camlift Bucket Steam Traps | Liquid Expansion Steam Traps | Strainers | Electric Temperature Controllers | Water Blenders | Self-Operated Temperature Controllers

Compressed-Air Separator Has High Capacity

Moisture, dirt, and oil in compressed air lines and equipment are removed by this new heavy-duty separator, designed to handle 125 cfm. at 100 psi.

Called Model 125S, unit is equipped with four cellular filters that have a capacity of 2,000,000 cu. ft. of compressed air without change of elements. Filters are of special formula to insure long, constant use without plugging.

Separator is built of 3-in. wrought iron pipe and fittings, is hot-dipped galvanized inside and out to resist corrosion, and has ½-in. connections. —*Beach Precision Parts Co., 120 Mechanic St., Boonton, N. J.*

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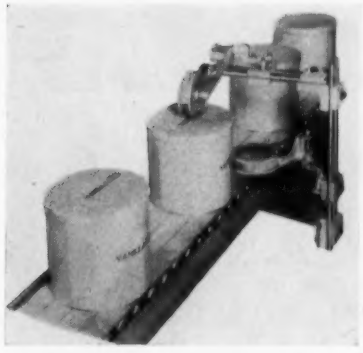

Adjustable Setup Permits Marking on Two Sides

A new mounting that attaches to a belt or roller conveyor and supports two automatic friction-operated imprinters is designed to permit simultaneous marking on both top and side of containers.

Installed in minimum space, this unit (Rolacoder) can be used to mark codes, lot numbers, and brand names on shipping cases, boxes, fiber drums and similar packages. Both units of the setup may be used to imprint the same legend, or each can carry a different one.

Since this mounting is adjustable it affords a maximum of marking versatility. By simply moving imprinters to appropriate positions, the unit may be used to mark containers of different size or to obtain marks in different locations on containers of same size. Also, when only top or side of packages are to be marked, only one of the imprinters need be used.—*Adolph Gottscho, Inc., Hillside 5, N. J.*

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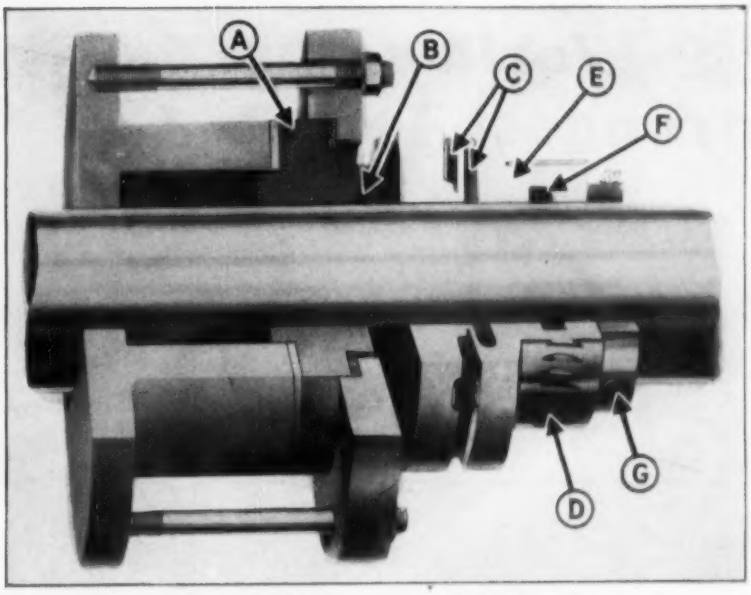


Efficient Seal Has High Corrosion Resistance

This new external, rotating mechanical seal for pump or agitator shafts is said to provide a perfect fluid seal without high friction load on the shaft.

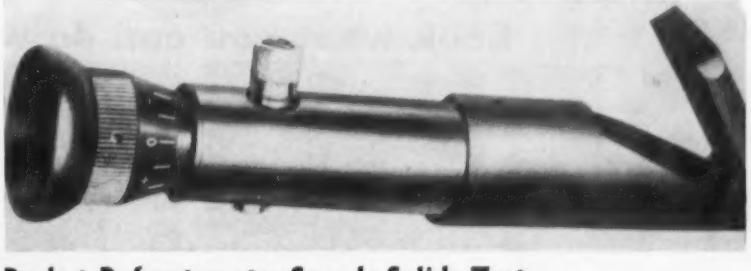
And very important, it does not contaminate any food product because of immunity to all food acids. Furthermore, the Teflon bellows sealing component has zero water absorption, hence cannot harbor bacteria.

As illustrated, this seal (Chemiseal) consists of a stationary face (A) secured to the stuffing box, and a rotary face (B) which rotates with balance of seal mechanism and is secured to shaft. Between these ground faces, a leak-proof seal is accomplished by spring-loaded Teflon bellows section (C).

Clamp (D) gives circumferential pressure on area (E), with help of a Neoprene or Teflon O-Ring (F). This secures the revolving part to the shaft. Back-up collar (G) is an added precaution to prevent seal from working out of the shaft.

Bellows design permits maximum operating conditions of 167 F. and 100 psi. (or 212 F. and 75 psi.) at seal faces. Units are offered in standard sizes from ⅞ in. to 2⅛ in., and other sizes are available for special applications.—*United States Gasket Co., Camden 1, N. J.*

Circle 133C on Reader Service Card



Pocket Refractometer Speeds Solids Test

For quick solids determination with products such as preserves, tomatoes, syrups, and juices, this National pocket refractometer offers a temperature-compensating mechanism that eliminates needs for thermometers or conversion tables.

User reads results directly on an engraved, illuminated scale. Since no addition or subtraction is required to allow for temperature variations, possibility of error is greatly reduced. Only a few drops of sample are needed for a test, and readings are noted at the intersection of the field-dividing line with the graduated scale.

World's Strongest Tape?

Even "Hard-Boiled" Haggerty can't break it!

"SCOTCH" Brand Filament Tape —super-strong, amazingly shock resistant. Thousands of filaments imbedded in the pressure-sensitive adhesive give up to 500 lbs. tensile strength per inch of tape width. Exclusive "mirror-surface" adhesive gives 100% tape contact—*puts all the tape strength to work.* We'll be glad to send complete information on how it can save money and solve problems for you. Just write.

FILAMENT TAPE

...one of more than

300 Pressure-Sensitive Tapes

for Industry, trademarked...

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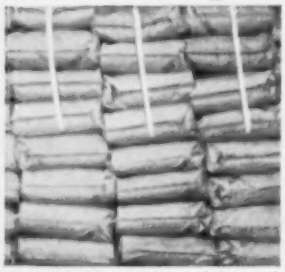
SCOTCH

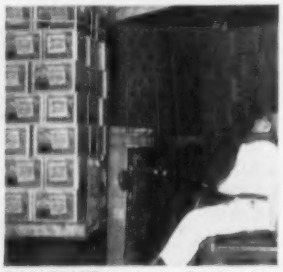
BRAND

Look what you can do with it!

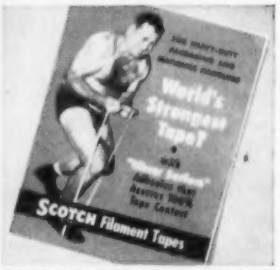
STOP opening damage to products by using Tear Strip Containers made with "SCOTCH" Filament Tape. Tape cuts carton from inside; eliminates need for knives, cleavers, wedges.



ELIMINATE shifting of bagged goods in transit by unitizing with "SCOTCH" Brand Filament Tape. "Mirror surface" adhesive sticks at a touch. Tape won't cut into bags; holds securely.



PALLETIZE cartons, drums, etc. for easier handling in storage and in transit. Wrap of "SCOTCH" Brand Filament Tape around top layer secures entire load; prevents shifting or slipping in handling.



FREE FOLDER gives complete data on "SCOTCH" Filament Tape: what it is; how it cuts costs in heavy-duty packaging and materials handling. Write on your letterhead to Dept. FE-55.

The term "SCOTCH" is a registered trademark of Minnesota Mining and Manufacturing Co., St. Paul 6, Minn.
Export Sales Office: 99 Park Ave., New York 16, N.Y. In Canada: P.O. Box 757, London, Ontario.

3M

Unit is available in three types to cover a range of 0 to 80% solids. Type 1 reads 0 to 30% in increments of 0.2%. Type 2 covers the 30 to 60% range in increments of 0.2%, and Type 3 extends from 50 to 80% in increments of 0.5%. If desired, readings may be converted into refractive index (1.3330-1.4901) by means of a reference table furnished with the instrument.—*National Instrument Co.*, 5005 Queensbury Ave., *Baltimore* 15.

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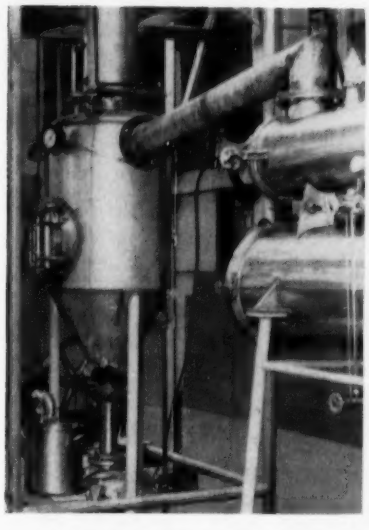

Viscous Fluids Handled By New Evaporator

Successful concentration of heavy, viscous liquids (such as tomato pulp to a 40% paste) is reported with use of a new evaporator, called Roto-Vak.

Unit features: (1) Simplicity—an important factor in cost, maintenance, and cleaning; and (2) speed of material passage, which minimizes degradation of heat-sensitive items by prolonged high temperature. Product is concentrated in one pass through the unit.

Viscous material is fed through a tangential inlet at top of vertical jacketed cylinder. High-speed rotor blades, having close clearance with heating surfaces, provide turbulence to assure uniform heat transfer. Heat is supplied in a jacket around the chamber by steam, Dowtherm, or other heating mediums.

Feed is thus heated rapidly for only a few seconds as it falls into separator chamber. Concentrate collects in cone-shaped bottom and is withdrawn immediately by pump to hasten cooling. Vapors are drawn off at top of separator chamber which is designed for minimum entrainment. Concentration is controlled by varying steam pressure or feed rate.

Unit is available in a wide variety of sizes, while specifications of materials and accessories depend on conditions of use.—*Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh.*

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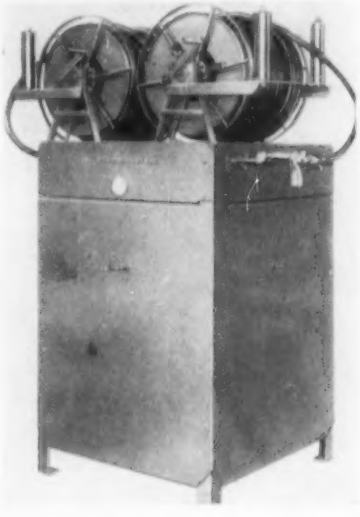

High-Pressure Fog Units Fight Fire Three Ways

Efficient, economical, and dependable fire protection is cited for a new stationary high-pressure fog units, which feature three-way action.

Fogging simultaneously cools, smothers, and isolates a fire. And very important from the standpoint of water damage, this equipment uses only $\frac{1}{6}$ the water required by conventional streams.

High-pressure fog is ordinary water put under 800 psi. by a positive displacement pump, and converted into a stream of microscopic particles by controlled release through a special gun. In fighting fire, this fog cools by absorbing heat, smothers by shutting off oxygen, and isolates by separating flame from the fuel source.

Cooling action results when fog is converted into steam. For example, fog from a gun discharging 30 gpm, at 50 F. absorbs 283,140 Btu per min. And when converted into steam, it expands to 1,700 times its original volume. This blanket displaces available oxygen to smother the fire. Furthermore, nozzle velocity of 60 mph. provides extinguishing action comparable to blowing out a match.

One station unit shown in photo (left, Model STA-35-BFF) discharges 35 gpm. at 800 psi. Assembly comprises: Positive displacement, reciprocating triplex pump; demountable, self-compensating hose reel with high-pressure swivel arrangement and guide rollers; 100 ft. of $\frac{3}{4}$ in. high-pressure hose; and adjustable gun with hose swivel and gun clamp mountings.

Pump has: Stainless steel, hardened ball valves; tapered valve seats; porcelain-lined, steel backed cylinders; and easily removed self-expanding piston cup packing. It is completely enclosed in a dust-free steel frame that also houses a lubrication system, filter, suction and discharge cutoff valves, relief valve; and 20 hp. motor with adjustable base and V-belt drive.

Motor is a 3 phase, 60 cycle, 220/440v. unit with 220 or 440v. magnetic starting switch assembly. And discharge starts automatically when gun is lifted from the clamps. Base dimensions are 32 x 35 in., and overall height (with hose reel) is 79½ in.

Two station unit (Model STA-60-BFF, right in photo) is similar to the single-station unit described, but discharges 60 gpm. at 800 psi. and is powered by a 30 hp. motor. Also there are duplicate discharge cutoff valves, hose reels, hoses, guns and clamp mountings. Base dimensions are 42 x 41¼ in., and overall height is 84⅜ in. *John Bean Division, Food Machinery & Chemical Corp., Lansing, Mich.*

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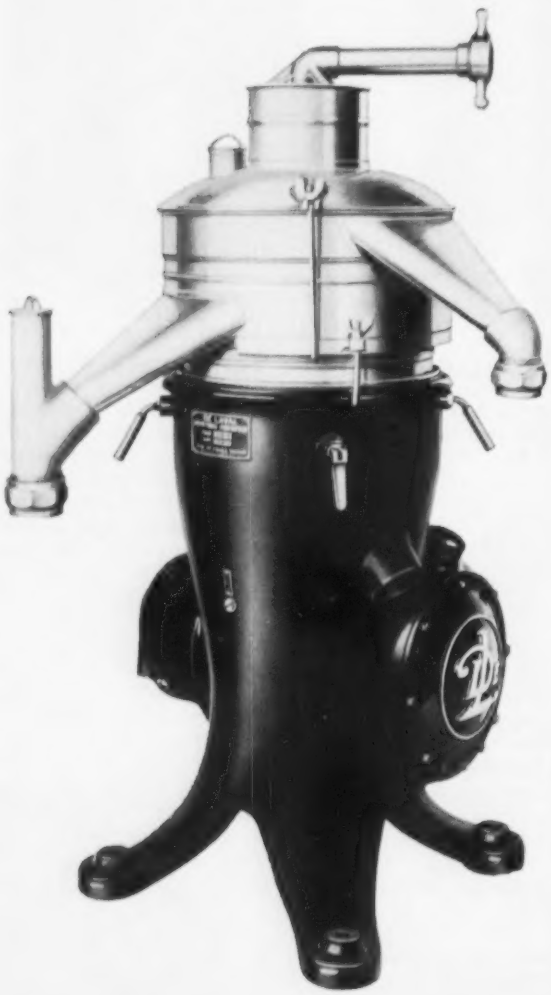
TIME SAVING...

PLUS!



Naturally De Laval Centrifugals save time in chemical and food processing ... because they eliminate old-fashioned "stop-and-go" filters or settling tanks... provide new efficiency, economy and profit!

But that isn't all! De Laval Centrifugals also improve the chemical or food product being processed... by doing a better separating job!

If you do liquid-liquid, liquid-solid or liquid-solid-liquid separating... ask us to tell you exactly how De Laval Centrifugals save time—and money ... *and* do a better separating job ... for leading chemical and food producers!

DE LAVAL

for faster processing systems

THE DE LAVAL SEPARATOR COMPANY Poughkeepsie, New York • 427 Randolph St., Chicago 6 • **DE LAVAL PACIFIC CO.** 61 Beale St., San Francisco 5

Interchangeable Kettles Mark Deep-Fat Fryer

Interchangeable fry kettles in this new electric floor-model deep fat fryer are designed to permit "custom frying" of breaded or unbreaded foods.

Called Model EF-55, it features a shallow kettle for fast frying of unbreaded items. And for breaded foods, the cool zone under heating elements of the deeper kettle traps crumbs. Fat breakdown and transfer of taste reportedly are also prevented.

Unit is said to pre-heat to 350 F. in 9 min., and is rated at 12 kw., 208-230v. Fat capacity is 28 lb. with shallow kettle, 33 lb. with the deeper one. Overall height, including splash back, is 42½ in., depth 30½ in., and width 20¼ in. It comes in standard satin chrome finish but is also available in stainless steel.

In addition, maker offers a smaller electric counter-model (EC-55) that is intended for all-purpose frying. This unit has a fat capacity of 15 lb., preheats to 350 F. in 8 min., and is rated at 5 kw., 208-230v. Height, including splash back, is 12¾, depth 20 in., and width 17⅛ in. Choice of finishes is the same as with larger model.—*J. C. Pitman & Sons, Inc., Concord, N. H.*

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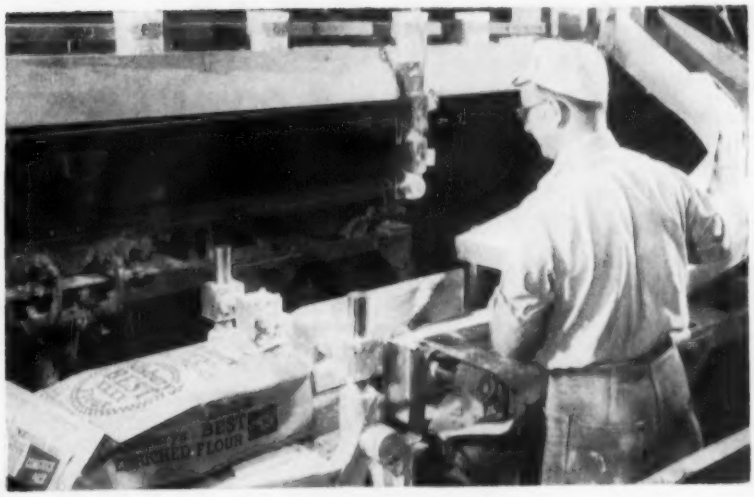

New Units Pack Flour in Semi-Rigid Bag

A novel packaging system is seen improving the appearance of family-size flour and cornmeal containers, reducing breakage, and saving space in storage.

Key to this system is a semi-rigid container made of a single ply of heavy-duty kraft paper. Bags of flour (2, 5, 10, and 25 lb.) are not rigid in themselves, but when tightly compressed into the container—with equipment developed by St. Regis Paper Co.—the whole unit makes a rigid package.

When highly stacked, these packages do not lose their shape or crumple at high humidity. Containers are said to occupy less storage space than corrugated boxes and can be stacked more compactly.

In addition to the semi-rigid container, other elements of the system include air-operated baling machine (250-B), settler-conveyor, and conversion kit of parts. Latter allows adaption of existing case sealers to sealing containers of this semi-rigid type.

Baling machine packs small packages tightly in the kraft container. It compresses the packages, shapes them for easy insertion into the master container, and forces them under pressure into larger bags. Tightly-filled units move to settler-conveyor which compacts them by means of oscillating side boards, then go to converted case sealer. Total elapsed time for entire operation averages less than two minutes.

Semi-rigid containers are termed suitable for multicolor printing since paper is printed before container is manufactured. This permits sharper color reproduction than can be obtained on corrugated boxes, which are printed after corrugation.

This system has been adopted by General Mills, Inc. and Pillsbury Mills, Inc., Minneapolis. Application of the semi-rigid container and packaging method to other products is being studied by—*St. Regis Paper Co., 230 Park Ave., N. Y. C.*

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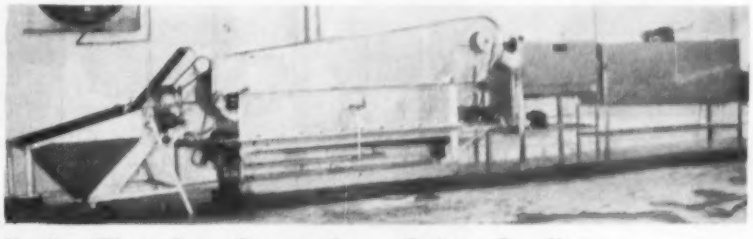


Peeler That Cuts Potato Loss, Raises Quality

Low-temperature model chemical peeler operates at below 135 F. to prevent heat damage to ready-raw potatoes. And it reportedly cuts peeling loss by as much as 50%. On utiltiy grade potatoes, unit requires three operators to run 1,500 lb. per hr. with a peeling loss of 12%.—*B & B Sales Co., 651 Wells St., S. W., Atlanta.*

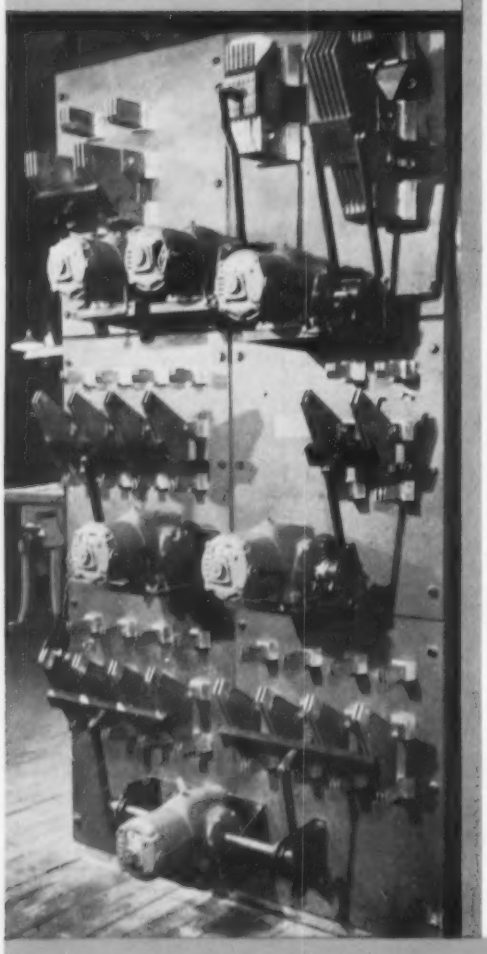
Circle 137C on Reader Service Card

Want More Information?

It's free—and easy to get. Simply note here the items on which you want more details, then circle each key number (there's one given at the bottom of each item) on the handy Reader Service postcard—back of book. Then sign at the bottom and mail.

For your convenience, too, items in this department are listed and keyed in the Reader Service Section.

Geared for smooth, slow speed



SIX Century Performance-Rated© GEAR MOTORS

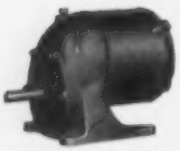
power this remote controlled Automatic Switch. These gear motors are ⅓ H.P., 5 r.p.m., right angle shaft.

Whatever your slow speed needs . . . from 4.3 to 780 r.p.m. . . . Century Gear Motors provide compact, quiet-running units hardly larger than conventional motors . . . in ratings from ⅛ to 150 H. P.

For quiet, dependable service, helical gears with "rotational tooth contact" help prevent uneven wear and minimize vibration. Extra-width pinions provide strength for greater shock load resistance and longer life.

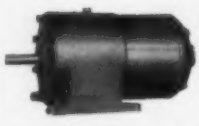
Tapered roller bearings enable the gear shafts to withstand radial and thrust loads without strain on the motor. Oil tight shaft seals make these motors particularly adaptable to shaft-down mountings on processing jobs where contamination is a problem.

Whatever the speed and power characteristics you need . . . AC or DC . . . Century Motors are Performance-Rated to do the job with top efficiency. For information, call your nearby Century Sales Office or Authorized Distributor.



Parallel shaft, single reduction . . . 280 to 780 r.p.m. . . . ⅛ to 150 H.P.

Right angle shaft, single reduction . . . 25 to 280 r.p.m. . . . ⅛ to 3 H.P.



Parallel shaft, double reduction . . . 37 to 280 r.p.m. . . . ⅛ to 150 H.P.

Parallel shaft, triple reduction . . . 7.5 to 37 r.p.m. . . . 1 to 150 H.P.

Right angle shaft, double reduction . . . 4 to 84 r.p.m. . . . ⅛ to ¾ H.P.

Performance-Rated© Motors ⅛ to 400 H. P.

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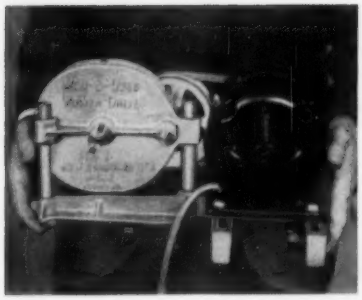

New Power Drive Offers Wide Speed Range

Designed to meet drive requirements of ¼ to 2 hp. motors are two variable speed reducers that provide an unlimited selection of speeds ranging from 1 to 750 rpm.

Known as Men-E-Uses, these low-cost units are termed particularly applicable to setting up production lines which are needed for short periods and then torn down. Thus, need for expensive single-purpose power drives for individual jobs is eliminated.

Shown above (Model No. 1) is the lighter of the two units which has a range of 20 to 750 rpm., and is for use with ½ hp. motors or under. Vertical posts permit positioning of gear housing on center with drive shaft. Minimum center of drive shaft to base is 3½ in., while the maximum is limited only by the length of standard vertical posts. However, these can be replaced with longer posts if necessary.

Double-end drive shaft has removable coupling pins for mounting pulleys, sprockets, or gears. A cast aluminum alloy base and gear housing provide increased strength, minimum weight, and protection from corrosion.

Also furnished with this unit is a manganese-bronze adapter and coupling. Latter provides double universal joint action which makes perfect alignment of drive shaft unnecessary. Universal adaptor fits all round, square, triangular, hexagonal, threaded or tapered shafts having diameters up to 1⅞ in.

Wide-face, cut-tooth steel pinion and semi-steel gears, running in oil with splash lubrication, afford long life. Gear housing and cover have a machined face which provides tight seal without use of gaskets. All bearings have oil-retaining grooves and are self-lubricating. Finally, unit has adjustable motor base that permits mounting of motor on either side, regardless of direction of motor rotation or shaft position.

Model No. 2 is designed primarily for heavy duty and can be used with ¼ to 2 hp. motors. This drive enables speed reductions from 1 to 150 rpm., and has adjustable rails for mounting motor on any of three sizes of unit. Other features are similar to those of the lighter No. 1 model.

No. 1 unit is 6 in. wide, 18 in. long, and weighs 12 lb. The No. 2 is 8½ in. wide, 13 in. long, and weighs 42 lb. — *New Standard Division, U. S. Expansion Bolt Co., York, Pa.*

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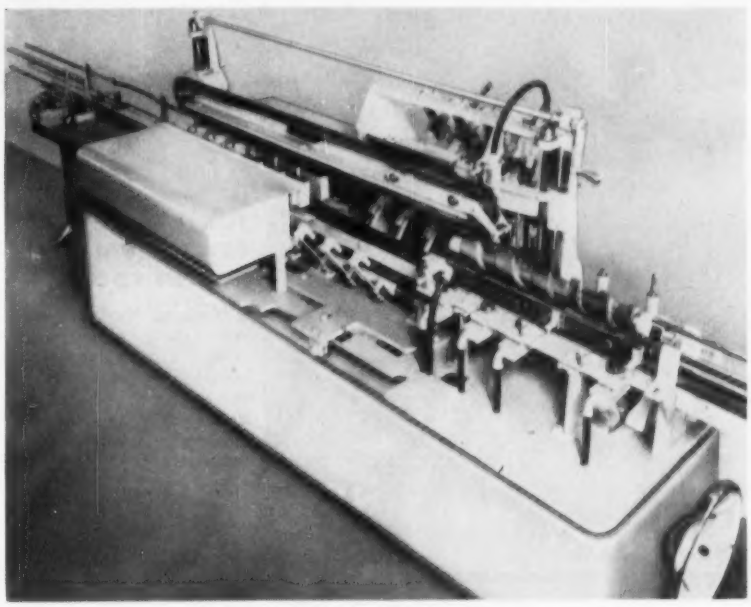

High-Speed Unit Applies Single or Multiple Labels

Straight-line operation, high speed (up to 300 glass containers per min.), and simultaneous application of single or multiple labels are design features of a new automatic labeler, known as World Super C. M.

In operation, glass containers are in continuous motion but firmly controlled. They are correctly spaced by a feed screw, then labeled three at a time. To assure positive registration, the center—not the end—of the label initially contacts the bottle. And air-operated pressure wipers are designed to fit the size and shape of containers.

Unit applies a variety of labels: Body labels only; front, back and shoulder types; and front, back and wrap-around neck labels or foil—all at the same time. A "no bottle—no label" control keeps labels in their holder unless and until a bottle is in position to receive them. And an improved gluing mechanism permits ready addition of labels and glue while labeler is in operation.

Label holder and gum box are so located that there is no danger of wash water, contents of a broken bottle, or broken glass getting into the glue or onto labels. Furthermore, the gluing mechanism operates at a speed slower than most labelers rated at 120 per min. (although unit labels at up to 300 per min.). This permits use of adhesives that are successful in slower machines.

Also provided is a unique air control that automatically reduces operating speed when flow of bottles is interrupted. As the flow returns to normal, machine gradually picks up speed to a point set by the operator for desired production.

Extra tall or oversize containers cannot cause damage or interfere with production because unit is equipped with safety devices that automatically stop the machine until operator removes the off-standard container. And another safety device at the discharge end stops the unit in the event of a pile-up at the case packer or on the packing table. Thus, containers cannot back up into the labeler. To assure this, extra contacts are provided to stop the machine ahead of the labeler.—*Economic Machinery Co., Worcester, Mass.*

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NIAGARA "NO FROST"

for Always Clean Food Freezing and Storage Rooms

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FOR BETTER QUALITY FROZEN FOODS
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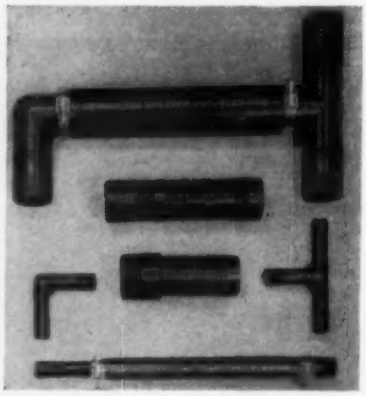
Equipment & Supplies



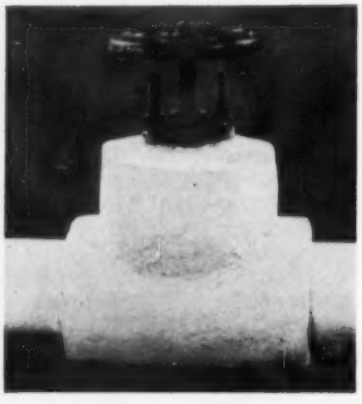
Sanitary Pipe and Fittings Made of Polyethylene

Recommended for transmitting beverages, juices, and pulp in food processing systems is a new line of flexible, lightweight plastic pipe and fittings, called Poly-Gem.

Size range from ¼ to 3 in. I.D. and clamps are of stainless steel. Plastic units are 100% polyethylene for immunity to rot, rust, and electrolytic corrosion. They are made to specific diameters and wall thicknesses —not drawn to reduced sizes.

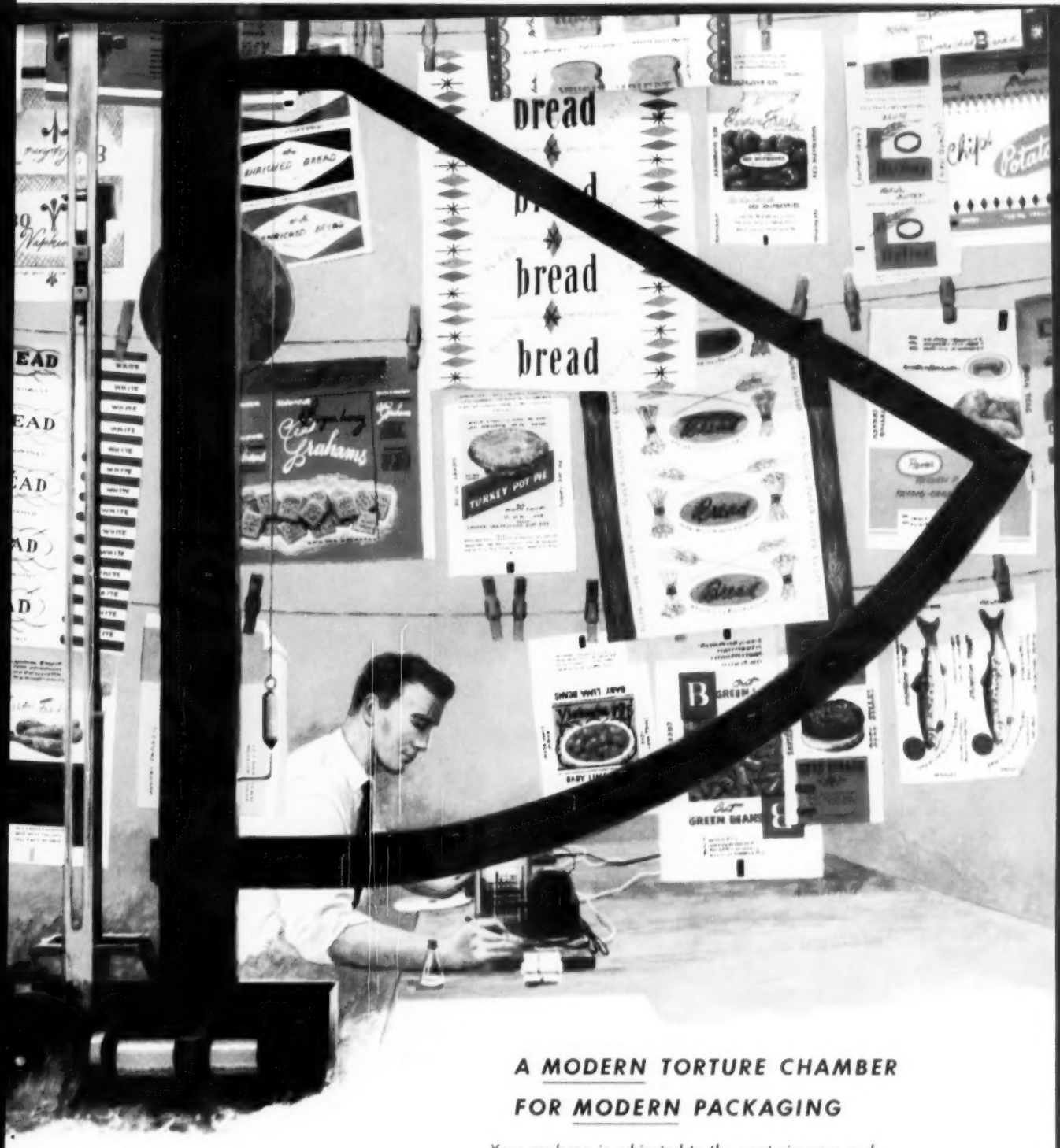
This is said to provide minimum residual strain which results in less cracking and decomposition on continued exposure to sunlight and adverse weather conditions. Furthermore, the plastic is non-toxic and resists growth of bacteria and molds.— *Acme Rubber Mfg. Co., Meade St., Trenton, N. J.*

Circle 140A on Reader Service Card



New Insulating Cement Is Simpler to Apply

Better adhesion, easier mixing, and improved handling and troweling are advantages cited for a new, white insulating-finishing cement.



A MODERN TORTURE CHAMBER FOR MODERN PACKAGING

Your package is subjected to the most vigorous and exacting punishment in Crown Zellerbach's Research Laboratories, the most modern and complete in the packaging industry.

All Western Waxed wrappers are completely tested under the most varied and extreme climatic conditions, from arctic cold to tropic heat. These same rigid standards of quality control apply throughout every step of our completely integrated operation from tree seed to package.

Yes, we torture your package to guarantee that your product will have maximum protection and appeal, from initial wrapping to final consumption.

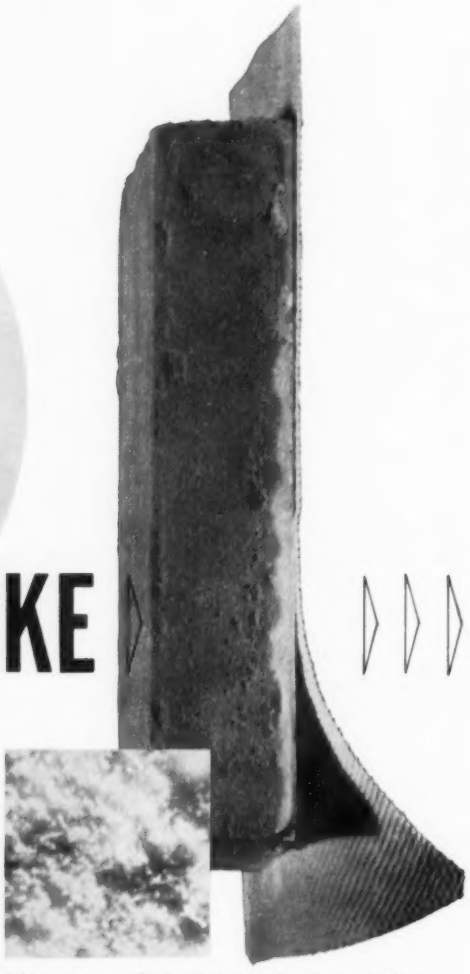
another reason why Western Waxed packaging materials are the best

WESTERN WAXED PAPER
DIVISION CROWN ZELLERBACH CORPORATION

Every 10 Seconds

there's a completely new filter face on a

DICALITE FILTERCAKE



For all practical purposes, that means that you have a *continuously fresh* filtering surface—all the time—for consistent clarity and constant flow rate. The mechanism of this is simple. The particles of Dicalite filteraid added to the raw liquor as "body-feed" travel with the liquor into the filter; there they are caught and held by the precoat or filtercake on the filter screens (together with the unwanted solids from the liquor) while the clarified liquor continues through.

This unretouched photograph of a section through an actual Dicalite filtercake shows the even dispersion of unwanted impurities throughout the cake and how easily the clean precoat peels from the screen or cloth. Inset shows surface magnified 75 times.

This continuously fresh filter face means that unwanted solids cannot mass together to blind the screen and halt the filtering action—a point of major importance in the case of slimy, sticky or gelatinous impurities. Instead, they are dispersed, distributed through the filtercake in such scattered fashion that the millions of microscopic channels through the filtercake remain open for maximum throughput combined with exceptionally "sharp" separation of solids.

No matter what your filtration problem, whether it be desired clarity or fast flowrate, it is very probable that it can be answered with one or another of the Dicalite family of filteraids . . . the finest in diatomaceous materials. For complete information, write to

1930 • 1955

25 YEARS

Dependable GLC GREAT LAKES Dicalite® DIATOMACEOUS MATERIALS

DICALITE DIVISION: GREAT LAKES CARBON CORPORATION, 612 S. FLOWER ST., LOS ANGELES 17, CALIFORNIA

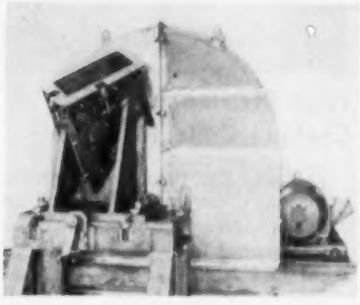
Equipment & Supplies

Called Super Powerhouse, this material is said to offer both insulating properties and a smooth, white finish when applied alone or over regular insulating cement, block, blanket, or other forms of thermal insulation. When used as the only insulating material on valves, flanges, fittings, and other irregular surfaces, it provides a white finish which blends with adjoining white insulations (photo).

Made of long, fine fibers of spun mineral wool, this product retains the characteristic density, coverage, low shrinkage, and high thermal efficiency of other mineral wool cements. It can be used to temperatures of 1,700 F., and has a glazed white surface when troweled.

In application, this hydraulic-setting material remains workable for one hour, and sets to initial hardness within two to three hours. After initial set it is thoroughly water-resistant. An area of 110 sq. ft. requires 100 lb. of cement to provide a firm, crack-free surface ¼-in. thick. And for finish coats ¼-in. to ½-in. thick, linear drying shrinkage is said to be negligible.—*Baldwin-Hill Co., Trenton, N. J.*

Circle 140B on Reader Service Card



Frozen-Meat Slicer Hastens Thawing

To reduce thawing time for frozen meat blocks to be processed, this 6-knife cutter (Murco 68″) chips them into thin slices.

Unit's capacity is 20,000 lb. per hr. if set to cut ¼-in. thick slices at 250 rpm. But maker states that this production can be greatly increased, since it is limited only by rate at which meat can be handled before and after cutting.

The disk is made of stainless steel plate (Type 304), 68 in. dia. x 2 in. thick, and accommodates six knives. Hood is of Type 302 stainless heavy-gage sheets provided with continuous welds throughout. All surfaces are polished and welds are ground smooth after fabrication. A sanitary feature

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the pioneer standardized invert sugar

Favored by leading food processors throughout the world since 1905

Retained moisture . . . one of the most valuable ingredients in food products . . . *is the symbol and substance of freshness.*

NULOMOLINE
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candies . . . beverages . . .
icings . . . toppings . . .
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processed foods . . .
frozen desserts.

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330 East N. Water St., Chicago 11, Ill. 1300 West 3rd St., Los Angeles 17, Calif.
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Aerial view of our Plant No. 1, Brooklyn, N. Y.

For more information, use coupon on last page.

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Give Accurate Readings FAST Eliminate Costly Overweights

You can speed up production and be more sure of accurate weights with EXACT WEIGHT Scales. Short lever fall plus the action of an adjustable damping device bring scale indicator to rest quickly. Fractional ounce visible indication and slant tower makes possible quick and accurate reading. Day-after-day savings will show up in the elimination of over-weights.

EXACT WEIGHT end-tower models are available in a wide range of models to fit your needs exactly. They are compact, occupy a minimum amount of space, weigh accurately even in out-of-level position.
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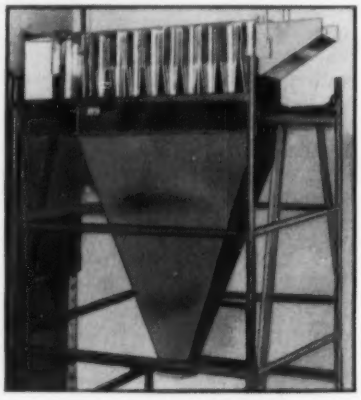
Equipment & Supplies

is built into the hood in that it is split vertically. Therefore, the two halves may be moved horizontally in two directions to expose the disc for complete cleaning and for easily washing the hood.

Spout is rectangular, 10 in. x 22 in., and inclined 50 deg. Long and short sides of the spout are set to form a 90 deg. "V" chute towards the disk. Frozen meat blocks slide down the chute by gravity, and the tilted spout sides hold them firm during cutting.

V-Belt drive is provided to transmit about 60 hp. to the disk at a speed of approximately 250 rpm.—*D. J. Murray Mfg. Co., Wausau, Wis.*

Circle 143A on Reader Service Card



High Efficiency Marks Cyclone Collector

Designed for high solids recovery with spray drying equipment, this new collector features an efficiency of 100% with particldes above 14 microns, and 90% down to 5 microns.

Known as Microclone, it handles a wide range of products high in fat and sugar—powdered milk, cream, and baby foods—without buildup or plugging. Other advantages cited are ease of cleaning and low maintenance.

Unit operates on a controlled helical-flow principle. Solids-laden gases enter stainless steel seamless tubes through tangential inlets from an unobstructed manifold. Thus, eddy currents are eliminated. Solids are separated within the tubes and discharge to a hopper.

Pictured above is an 18-tube collector. Its unique cover arrangement opens for easy access to the tubes. Number and location of these tubes may be varied to suit particular job requirements and space limitations.—*Process Products Division, Dustex Corp., 1754 Walden Ave., Buffalo 25, N. Y.*

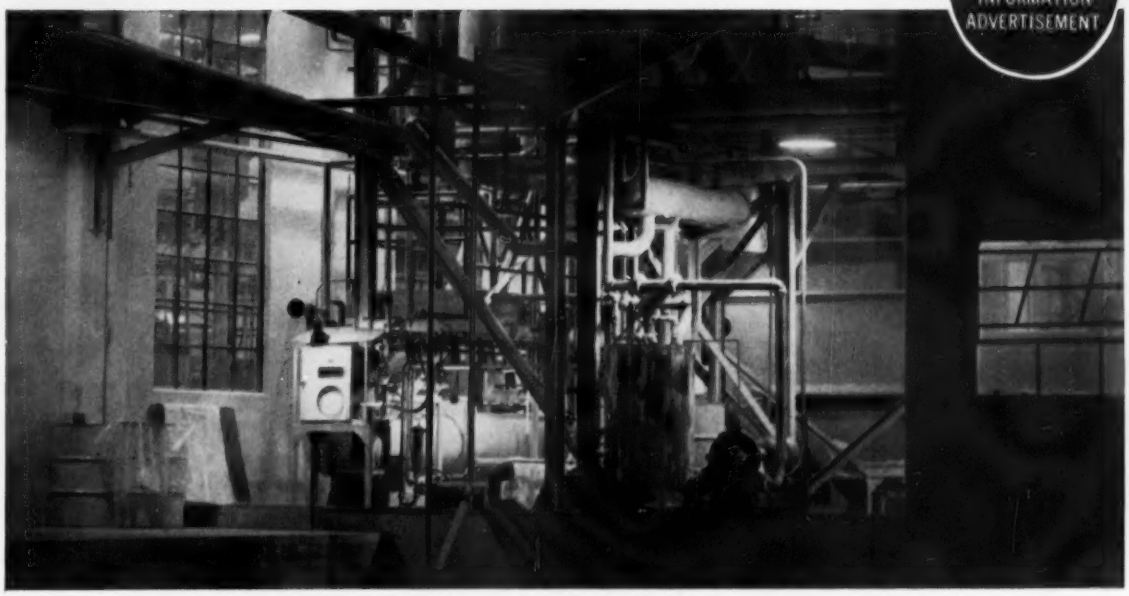
Circle 144A on Reader Service Card

NEW facts for your files on York Ammonia Rotary Booster Compressors for

Frozen Food Warehouses

York refrigeration air conditioning

INFORMATION ADVERTISEMENT



York Ammonia Refrigeration Equipment at the Exchange Lemon Products Company, Corona, California, includes 7 high-speed York V/W Compressors and 3 York Rotary Booster Compressors. This compound compression system totals approximately 100 tons refrigeration at –30°F. suction temperature. Four levels of ammonia pressures are maintained for the various cooling and freezing loads: east storage room at –10°, S.W. storage room at 35°, N.W. storage room at 20°, and freezing tunnel at –40°. Contents of this warehouse would fill a freight train more than 3 miles long.

TEMPERATURES GOING DOWN—and compound compression systems meet lower temperature requirements most economically. York Rotary Booster Compressors are designed for this type of system.

LOAD GOING UP—equipment must deliver more cooling for the space it takes up. York Rotary Booster Compressors provide high capacity in small amount of space.

GREATER LOW-TEMPERATURE ECONOMY WITH COMPOUND COMPRESSION SYSTEMS—and York Rotary Booster Compressors add to economy, always start unloaded to reduce starting power requirements.

OPTIONAL POWER SUPPLY—York Rotary Booster Compressor speeds allow direct connection to, or V-belt drive by, A.C. or D.C. motors and, in some cases, to internal combustion engines.

EASY INSTALLATION—because York Rotary Booster Compressors' compact size and purely rotating motion make much lighter foundations possible. Floor space and headroom, too, are kept to a minimum.

ENGINEERING SERVICE—York's vast experience in the freezing and storage of foods is part of a complete York service available to your design engineer.

Some Helpful Hints for Warehousemen

1. To reduce the amount of air transmission between cold rooms and outside areas, install a double set of doors that create an air lock between the two areas. Also, when possible, have only one door leading into a cold storage area open at a time, since this will lessen drafts.

2. Electric heating coils, installed on jambs, heads and bases of cold storage doors, will prevent them from freezing in place.

3. Install bumper posts several feet out from the hinged end of the cold storage doors. Properly installed, these will "channel" fork lift trucks entering the cold storage areas and prevent them from entering at an angle that could damage the doors. It will also improve the flow of traffic in and out of the cold storage area.

CUT ALONG THIS LINE AND FILE

A.I.A. FILE NO. 34-H-4

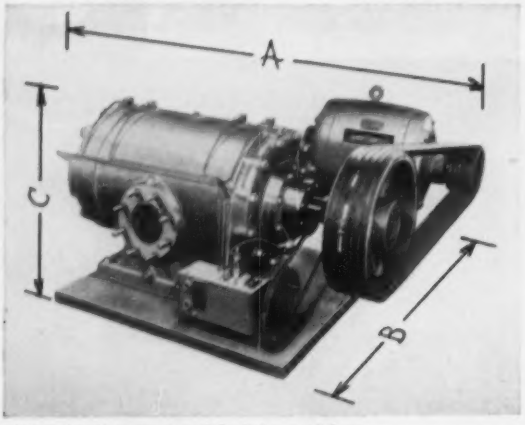
CUT OUT AND FILE—SEND FOR FREE FILE FOLDER AND REPRINTS—SEE OTHER SIDE

For more information, use coupon on last page.

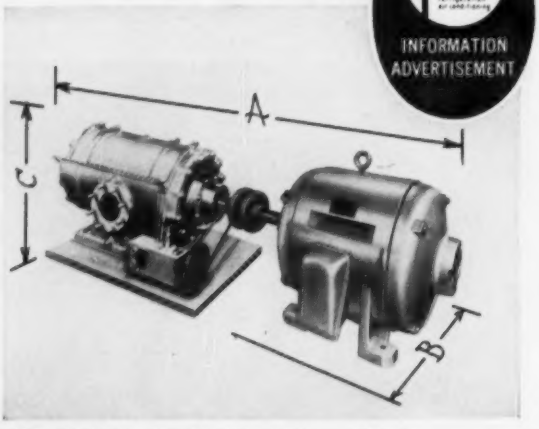
YORK AMMONIA ROTARY BOOSTER COMPRESSORS FOR FROZEN FOOD WAREHOUSES (CONT'D)

YORK AMMONIA ROTARY BOOSTER COMPRESSORS

INFORMATION ADVERTISEMENT



Model 23C, showing belt drive and base



Model 5CCA, showing direct drive and base

York Rotary Booster Compressors bring important advantages to cold storage warehouses. In compound compression systems, for example, York Rotaries provide efficient and economical operation where evaporator pressures are extremely low. Their volumetric efficiency, under such cases, equals or exceeds that of the reciprocating-type compressor.

TYPICAL DIMENSIONS

V-BELT DRIVE	DIRECT DRIVE
(A) including motor and depending on model chosen 28"–83"	(A) including motor and depending on model chosen 55"–132"
(B) 75"–163"	(B) 29"–111"
(C) 34"–62"	(C) 22"–62"

PRINCIPAL FEATURES

EASY STARTING—Rotary compressor pumping does not begin until centrifugal force causes the blades to move outward to the cylinder wall. Thus, starts are always made from an unloaded position, with only the inertia of the rotor to overcome.

EASY MAINTENANCE—All wearable parts in York Rotary Booster Compressors are easily removed and replaced when worn.

EASY INSTALLATION—Compact size, light weight and vibration-free operation of York Rotary Booster Compressors minimize space requirements and permit easy installation.

OPERATION—York Rotary Booster Compressors consist essentially of a water-jacketed casing or cylinder within which is an eccentrically mounted rotor of smaller diameter. Blades or vanes ride in slots milled into the rotor. The blades are forced to the cylinder wall by centrifugal force. Gas is drawn into the compressor between a pair of these blades; and, as the rotor turns, the blades are forced back into their slots by the cylinder walls, and the gas is compressed.

SPECIFICATIONS—STANDARD UNIT

CAPACITY—from a few tons to 350 tons refrigeration capacity in a single unit.

ROTOR—Special high-tensile strength iron alloy in sizes up to 13. From 13 and above, the rotor and shaft are machined from a single steel forging.

BLADES OR SLIDING VANES—Durable Phenolite, a laminated asbestos impregnated with phenolic resin and heat treated.

SEAL—A spring loaded double seal assembly composed of two cast iron collars and two stationary carbon rings.

LUBRICATION—Mechanical lubricator furnished with each compressor. Individual feed to each lubrication point.

DRIVE—Models 5CCA, 5CCB and 27D may be direct connected only. All other models are available for either direct connection or V-belt drive, dependent upon motor horsepower.

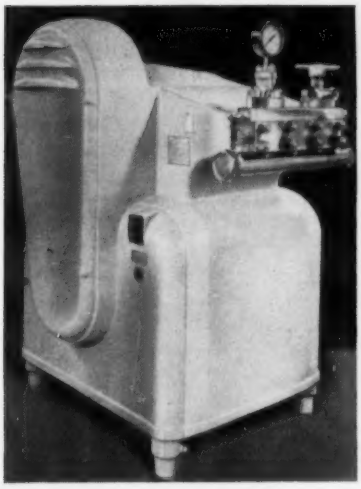
CUT ALONG THIS LINE AND FILE

YORK CORPORATION

the quality name in refrigeration

HEADQUARTERS FOR MECHANICAL COOLING SINCE 1885

Equipment & Supplies



Homogenizer Redesign Improves Operation

New features incorporated in the redesign of this homogenizer (CP Multi-Flo) for milk or mix reportedly offer improved performance and less maintenance.

Its single-service valve is shaped to provide efficient break-up and dispersion for greater product uniformity. Furthermore, this inexpensive valve is said to be quickly and easily replaced. The homogenizer head now uses only one plunger packing ring per cylinder, while the nylon seal seat and follower further reduce maintenance.

Unit employs a clamp-on, suction-type manifold that has plastic seal rings to assure positive sealing. And there is stainless steel construction for all metal in contact with the product.

With this flexible design, capacity of most models may be boosted simply by adding larger components on the original frames. Capacities range from 125 to 2,500 gal. per hr.—*Creamery Package Mfg. Co., 1243 W. Washington Blvd., Chicago 7.*

Circle 147A on Reader Service Card

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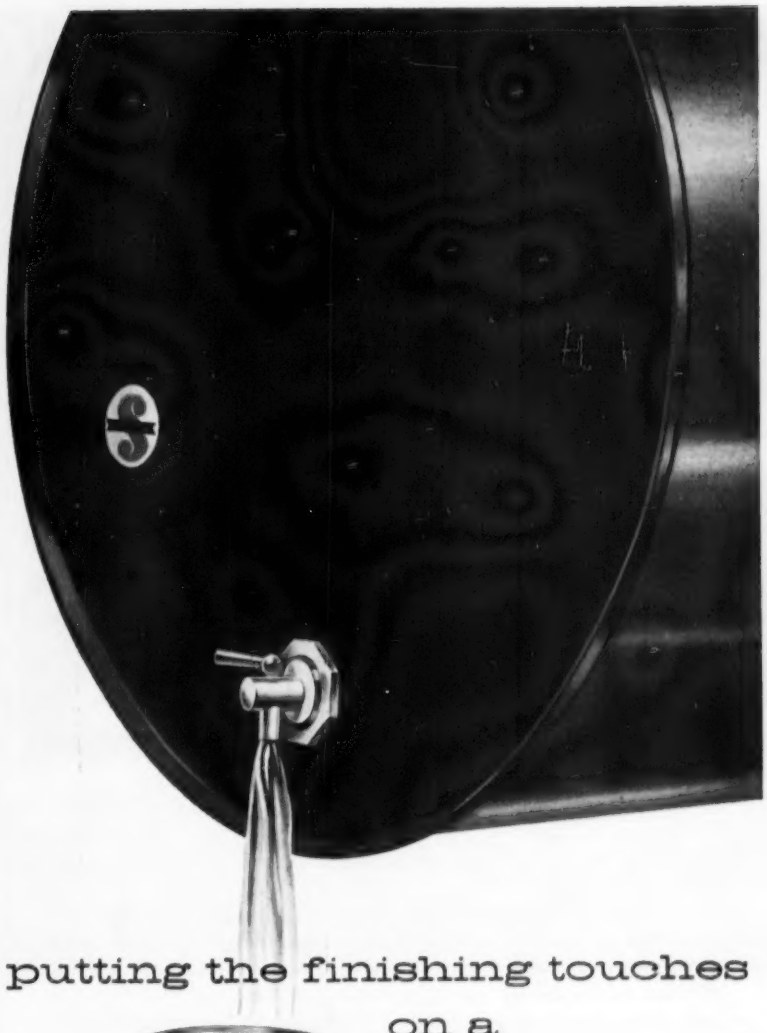

putting the finishing touches on a quality product

In order to fully prepare a product for today's competitive market you have to make sure it maintains its quality *after* it leaves your plant. That's where new steel shipping containers help out! By shipping in new steel containers you protect uniformity and purity . . . guard against product contamination and drum leakage during shipment and in storage. New drums decorated with your trade mark establish brand identity . . . create new brand preferences. Look for NEW CONTAINER "Red-S" label of the Steel Shipping Container Institute . . . the symbol of a quality-packed product.

"It's Better to Ship in Steel"

STEEL SHIPPING CONTAINER INSTITUTE
600 Fifth Avenue, New York 20, N. Y.

You too can discover

Exposes foreign matter and residue! Resists oils, acids, alkalies!

Globe White Neoprene Rubber Belting installed on leading make conveyor.

EXPOSED: Dust, dirt and other accumulations! Product particles that are left behind!

The snowy whiteness of Globe White Neoprene Belting exposes them all to certain detection, enabling immediate elimination with hot water or live steam. *That's sanitation-plus!*

Known as the do-all conveyor belting of the food industry, for which it was specifically developed, Globe White Neoprene Rubber Belting consists of multiple layers of hard-woven, light duck, molded together with highest grade neoprene rubber between the plies and over the entire surface . . . finished with a 3/64" thick, satin-smooth cover on the carrying side and with a friction surface on the pulley side.

The characteristics of this type of construction are unmatched: Exceptional flexibility; high tensile strength; minimum stretch . . . all extremely advantageous in operations where head and tail pulleys are small, and on machines with limited take-up facilities.

Resistant to oil, grease, acids, alkalies — possessing a satiny smoothness that makes no impression whatsoever on the product conveyed, Globe White Neoprene Rubber Belting is today on the "must" list of numerous food processing and handling concerns.

Also available in Black. Ask about Globe White Ruff Top Neoprene Incline Belting, Globe Brown Neoprene Belting, with friction surface on both sides, and Globe Brown Kling-Top Neoprene Belting, with non-slip top for incline and decline.

Write Dept. E for free samples, literature and the name of your local distributor.

GLOBE WOVEN BELTING CO., INC.
1400 CLINTON STREET • BUFFALO 6, NEW YORK
KNOWN FOR QUALITY THE WORLD OVER

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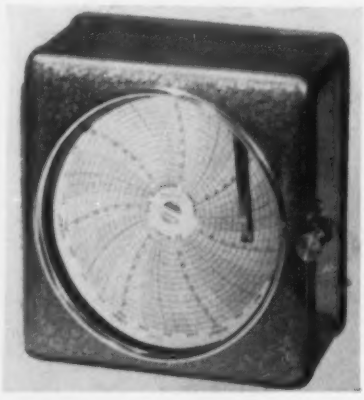

Unit Continuously Logs Truck Temperature

To help in determining the exact condition of a shipment of perishables on arrival, this new temperature-recording instrument provides a continuous written record of temperatures ranging from −20 F. to 120 F. Thus, this inexpensive device provides means of defining the lowest-cost method of safe transportation.

Known as Minicorder Type 1, it is specially designed to perform accurately throughout a bunny ride of as long as a week in a truck or rail car. Unit is housed in a sturdy case measuring 5¼ in. square and 2 in. deep.—*Dickson Co.*, 7422 *Woodlawn Ave.*, *Chicago* 19.

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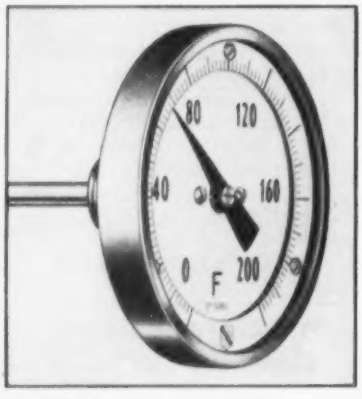
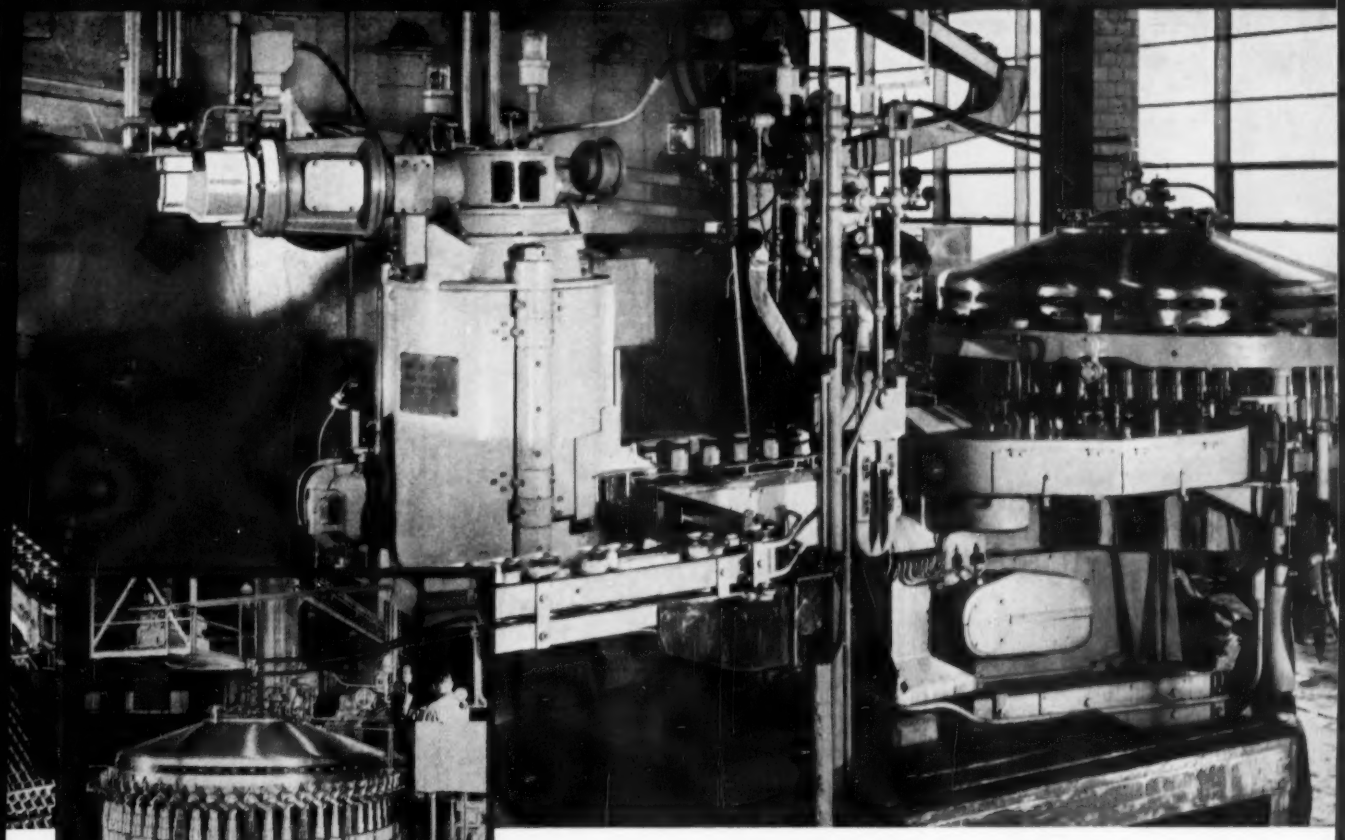


"Anti-Parallax" Dial Is Easier to Read

This all stainless steel bi-metal thermometer employs a new anti-parallax dial for ease and accuracy in temperature readings.

Graduations are carried on a raised ring set close to the cover glass. Index-type hand is at the same level, thus perspective effect of pointer

You too can discover
THE WAY UP IS OILGEAR



Beer Can Filling and Closing Machines equipped with Oilgear "ANY-SPEED" Drives are operating in many breweries. With Oilgear, beer can filling and closing production climbed from 360 to 600 cans a minute.

OILGEAR
Fluid Power

PIONEERS...NOW THREE PLANTS FOR FLUID POWER

PUMPS, MOTORS, TRANSMISSIONS, CYLINDERS & VALVES

"ANY-SPEED" DRIVES BOOST FILLING-CLOSING RATE TO 600 BEER CANS PER MINUTE. SIMPLIFY MACHINE DESIGN TOO.

There is a necessity upon every machine designer to improve the performance of his machines—if he can. When the designers of beer-can filling and closing machines raised the rate from 150 to 360 cans per minute, the drive limit seemed to be reached. Yet, their users wanted more production *without spillage* or can conveyor problems.

Then these engineers tried Oilgear "ANY-SPEED" Drives . . . the Fluid Power and Control that gave them what they wanted and—even more.

These engineers stipulated: • accelerate machines to half speed in 2 seconds • accelerate machines to full speed in 5 seconds • decelerate and stop machines in 4/10 seconds • a filling-closing rate of 425 cans per minute.

The Oilgear drive accelerated and decelerated so smoothly, it actually provided: • acceleration to full speed in 2 seconds • deceleration and stop in 2/10 seconds • a filling-closing rate of 600 cans per minute.

That's not all. Oilgear's cushioned application of power plus inherent positive protection against high overload starting torques and lower overload running torques eliminated the need of mechanical slip clutches. Thus, the machine design is simplified and maintenance is negligible.

This smooth yet swift acceleration and deceleration that allows brewers to handle full cans without spilling is one of two tremendously important Oilgear advantages. Utterly variable, flexible and controllable speed is the other. These and other superiorities are writing new history in machine design. *You ought to know the details of that history.* Why don't you contact a nearby Oilgear engineer, or write to Milwaukee. No cost, but the profits may be great.

THE OILGEAR COMPANY
1580 W. Pierce Street
Milwaukee 4, Wisconsin

where it touches food

USE STAINLESS

...for cleaner, more economical processing

Check through this list of advantages and you'll see why Crucible Rezistal® Stainless Steels have gained such wide acceptance in the meat and food processing industries —

- **Do not change the flavor or appearance of food in any way.**
- **Resist the corrosive attack of food acids and other elements.**
- **Withstand harsh cleaning chemicals that might affect other metals.**
- **Clean easily without developing the rough spots that harbor bacteria.**
- **Can't chip . . . they're solid stainless all the way through.**

Crucible Stainless Steels offer another practical advantage — *ease of fabrication*. You can bend them, shape them, weld them, machine them — make any equipment, no matter how complex, out of Crucible stainless. But let us help you decide how to put stainless steel to work for you. For fast action — call Crucible. *Crucible Steel Company of America, Henry W. Oliver Building, Pittsburgh 22, Pa.*

Crucible Stainless Types for Food Processing

STAINLESS REZISTAL TYPE	NOMINAL %* Cr	Ni	Other	USED FOR
302	18	8		General Purpose
303	18	8	S or Se	Free-machining
304	19	9	.08% Max. C	Welding
316	18	12	Mo	High Corrosion-Resistance
304 LC	19	9	.03% Max. C	Used where intricate welding is required
316 LC	18	12	Mo Low C	Used where intricate welding is required
347	18	8	Cb	Welding (stabilized)

*Subject to U. S. Government restrictions.

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

above dial is overcome and error due to parallax is greatly reduced. Combining the stainless steel case with threaded stainless bezel and gasketed heavy glass front permits operation under corrosive conditions.

To provide strength, rigidity, and tight closure against pressure, unit's small diameter stainless stem is mirror polished and all joints are welded. Silicone dampening of the element reduces destructive effect of vibration, and also acts as a heat transfer medium to further accelerate response.

Case is of 3 in. dia., and has bimetal coils welded to the stem plug. Thermometer is accurately centered in the stem to eliminate the retard effect and inaccuracy caused by coil rubbing on a side wall. Ranges are available from 80 to 1,000 F., with dials graduated in either Fahrenheit or Centigrade.—*Manning, Maxwell & Moore, Inc., Stratford, Conn.*

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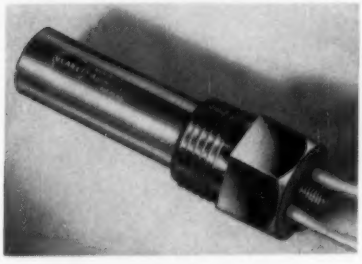

Cartridge Thermostat Withstands Clamping

Set calibration of this metal thermostat reportedly is not affected by mechanical clamping of the cartridge. Since it does not rely on expansion of the outer shell for make and break of contacts, slight mounting pressure has no effect.

New unit (Model FM-132) is highly sensitive yet mechanically rugged for severe industrial service. Operating range is 0 to 600 F., and rating is 1,200 w., 115-230v. a.c. noninductive load.

Other features: Completely sealed assembly to prevent contamination of parts, lead wire strain-relief protected, calibration unaffected by vibration, rapid response because of short heat transfer path, and simple self-locking adjustment screw.

Thermostat is available with normally open or normally closed contacts. Outer shell may be of brass, stainless steel, or special alloys. — *George Ulanet Co., 418 Market St., Newark 5, N. J.*

Circle 151A on Reader Srevice Card

ALGIN
STABILIZERS and EMULSIFIERS

may solve your problems if you make any of these foods

SALAD DRESSINGS, MEAT AND MUSTARD SAUCES — *emulsion stabilization*

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CANDY — *moisture retention*

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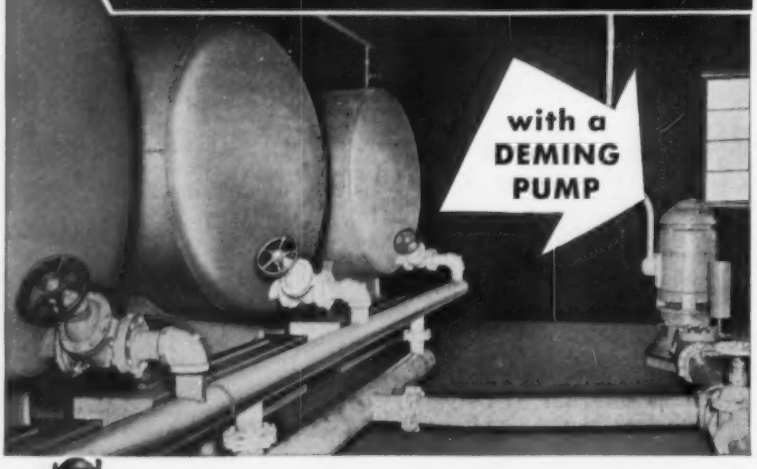
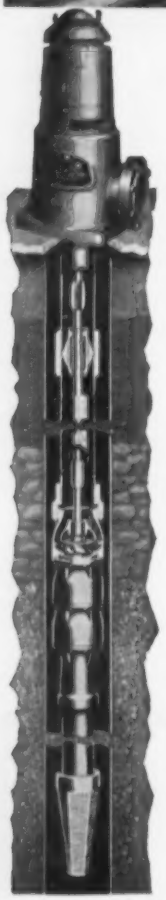
Against potential shortages





● A reserve supply of water for protection against shortage is a *"preventive form of insurance."* That and other considerations caused a midwestern manufacturer to call in a Deming Distributor for assistance in planning the company "water works" illustrated above.

Other considerations included the high cost of "city water;" the uncertainty of city supply during summer peak demands; and the need to process water in advance of its use in plant operations.

Water is pumped from a 140-ft. deep well on company property. Capacity of the Deming Vertical Turbine Pump is more than 650,000 gallons a day at 50-70 lbs. pressure. Pump is operated by a 50 H.P. motor. The three storage tanks shown in the picture have a combined capacity of 22,500 gallons.

The "pay-off" on this installation is the big reduction in water costs and the "preventive insurance" against possible stoppage of plant operations due to lack of water.

Investigate the advantages of Deming Vertical Turbine Pumps. Write for BULLETIN NO. 4700.

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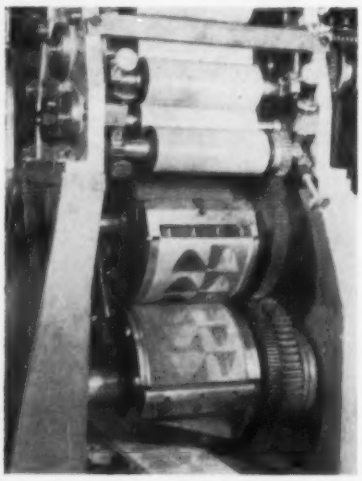
Equipment & Supplies



High-Speed Offset Press Prints Five Colors

Cited as particularly suited for short-run, multi-color printing of items such as labels, tags, and coupons is a new web-fed dry offset press that prints up to five colors at 9,000 impressions per hr. per color.

Color registration is termed excellent due to accuracy of the feeding mechanism. It incorporates a precision indexing drive and special pin-feeding method. And a new ink distribution system, featuring improved fountain design with ten rollers on each head, provides better ink coverage. Small plates of 0.025-in. magnesium or zinc, etched to a depth of 0.011 in., are said to be comparatively inexpensive and simple to use.

Presses are available with one to five heads printing on a 6 in. x 5½ in. bleed surface, and can easily be modified to increase printing width. — *Ferguson Machine & Tool Co., Roller Gear Div., P. O. Box 191, St. Louis 21.*

Circle 152A on Reader Service Card

New Chemicals

New Sequestering Alkali Dissolves Calcium Salts

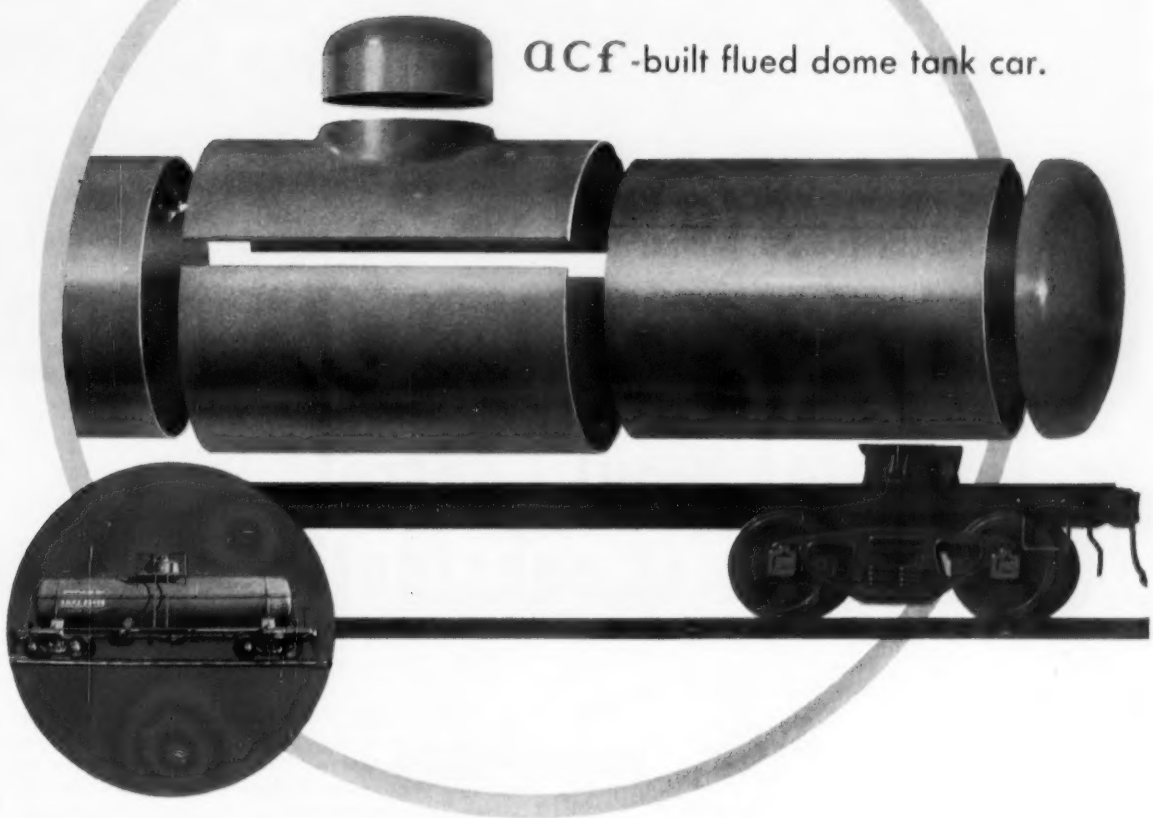
Recommended for bottle washing, metal cleaning, and general food-plant sanitation is a new balanced alkali that contains 50% liquid caustic soda and a sequestering additive.

Known as No Specx, it is designed to rapidly remove aluminum-foil labels in bottle washing operations. Furthermore, the sequesterant dissolves calcium salts to minimize troublesome formation of insoluble calcium alumino-silicate scale.

RING-SECTION CONSTRUCTION

another EXCLUSIVE feature of DURADOME

acf-built flued dome tank car.



ONLY DURADOME gives you the advantage of superior "ring-section" construction . . . formerly found only on pressure cars. This cylindrical construction means heavy steel *all* the way around—not just at the bottom—for greater durability and protection of costly ladings. Each tank is tested at pressures considerably higher than I.C.C. specifications.

Note that extra heavy gauge top center section—perfectly flued to form the dome base. This exclusive feature gives you a smooth interior for unequalled ease of cleaning . . . much better application of lining . . . unmatched structural strength and corrosion resistance.

• • •

These exclusive DURADOME features . . . *plus* the *standardized underframe* and *all-welded insulation jacket* . . . are yours at no extra cost. Contact your Shippers' representatives for details on buying or leasing the revolutionary new DURADOME.

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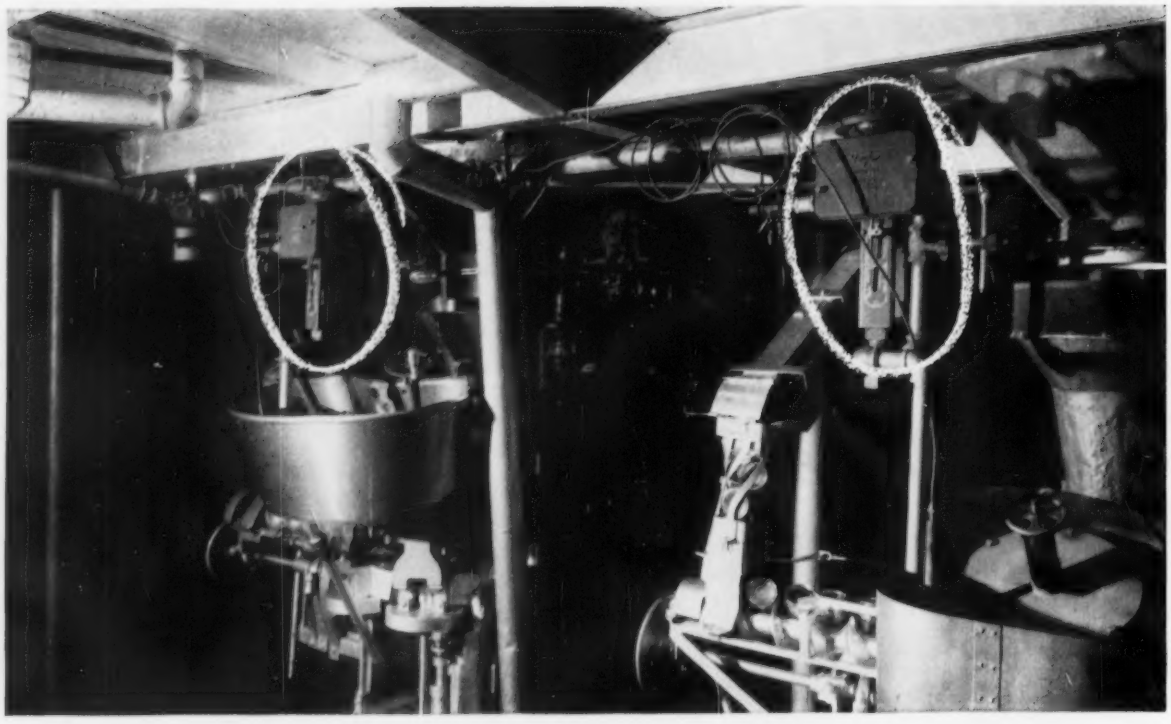
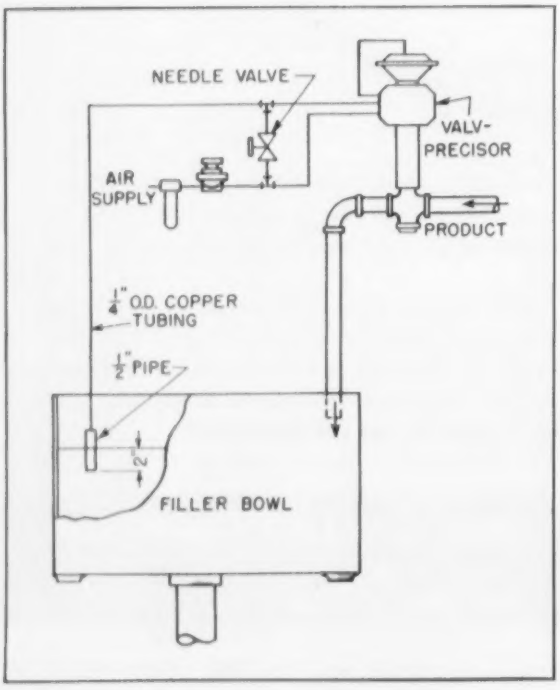


Taylor Filler Bowl Control produces substantial savings

for Libby, McNeill & Libby



ACCURATE control of the level in the filler bowls of the 10 closing machines at their Walla Walla, Washington, pea packing plant was achieved by the Taylor control system illustrated. Result—no overflow, no waste, no time lost in cleaning up the mess. In addition this Taylor control system is entirely automatic—no operator attention is required.

Filler bowl level is sensed by a simple air bubble system, the back pressure of which goes to a VALV-PRECISOR* Positioner which in turn operates the diaphragm valve in the product line. Alternative systems can be float actuated, or a 3-way sanitary valve can be used to divert the surplus back to the supply.

Preventing waste and saving operator time are just a couple of the ways Taylor instrumentation contributes to processing efficiency in the canning industry. It's very possible that automatic control can save you money too. Why not consult your Taylor Field Engineer, or write for the **new Catalog 500.**

Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.

*Reg. U.S. Pat. Off.

Taylor Instruments
MEAN ACCURACY FIRST

Equipment & Supplies

Bottles are said to come through the washing machine free of rusty necks and pigment specks and no scale forms on pockets, chains, or heater coils. And alkali consumption is at a minimum because run-off from metallic-bright surfaces is complete.—*Milport Chemical Co., 400 W. Oregon St., Milwaukee 4.*

Circle 152B on Reader Service Card

Water-Seepage Checked With Cement-Base Paint

Leakage of water through masonry or cinder-block walls reportedly can be controlled with a new ready-mixed, cement-base paint, called Waterfoil. Applications include protection of furnaces, electrical equipment, and warehouses from exposure to water.

Material may be applied to a wet or dry wall without saturating the surface with water before or after treatment. A combination of self-hydrating agents renders it self-curing. Through chemical interaction, latter expands within surface voids to form a cement-like coating that cures into a stonelike water barrier. This permits breathing of underlying masonry but does not allow passage of water.

Paint is non-toxic and can withstand hydrostatic pressure of 500 lb. per sq. ft. It may be applied with an ordinary white-wash brush and dries within 8 to 10 hr. An area of 30 ft. x 22 ft. requires about 10 gal. for a two-coat application, which is recommended.—*Sun Chemical Corp., 10th St. & 44 Ave., L. I. C., N. Y.*

Circle 155A on Reader Service Card

Chemically-Pure Reagents Offered in Gram Lots

Reagent chemicals, formerly obtainable in minimum quantities of ¼ lb. (glass bottles), are now available in 10 and 25g. individual packages.

New envelopes, called Gram-Pac, are triply laminated, chemically resistant disposable units. Innermost layer is polyethylene for chemical inertness, next layer is aluminum foil for strength, and outside is acetate for waterproofing. Thus, packages are termed excellent even for efflorescent, deliquescent, and photosensitive chemicals.

At present, 25 common reagents (each with lot analysis) are offered in this packaging. However, maker plans to expand line to cover the nearly 200 chemicals for which purity specifications have been established.—*Fisher Scientific, 717 Forbes St., Pittsburgh.*

Circle 155B on Reader Service Card

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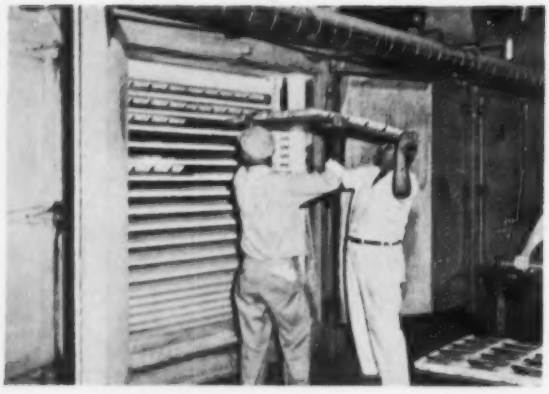

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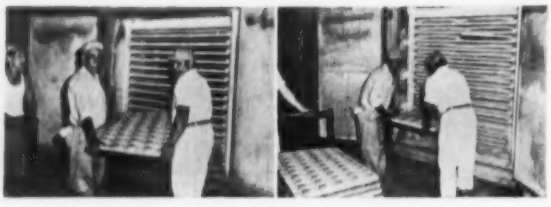


Equipment & Supplies Briefs . . .

Sp. G. Indicator is designed for rapid and accurate continuous density measurement. Instrument has safety-glass enclosed hydrometer, thermometer, and dowel pin construction for easy disassembly. Available in 316 stainless, steel, brass, Hast. "C," or Durimet.—*Brooks Rotameter Co., Landsdale, Pa.* (156A)

"Over-Under" sausage scale maintains uniform weight of stuffed links. Featured in 25-lb. capacity unit are 16 oz. range with 1 in. of indicator travel for each 4 oz., stainless platter (20x24 in.), and assortment of counterweights.—*Exact Weight Scale Co., 944 W. Fifth Ave., Columbus, Ohio.* (156B)

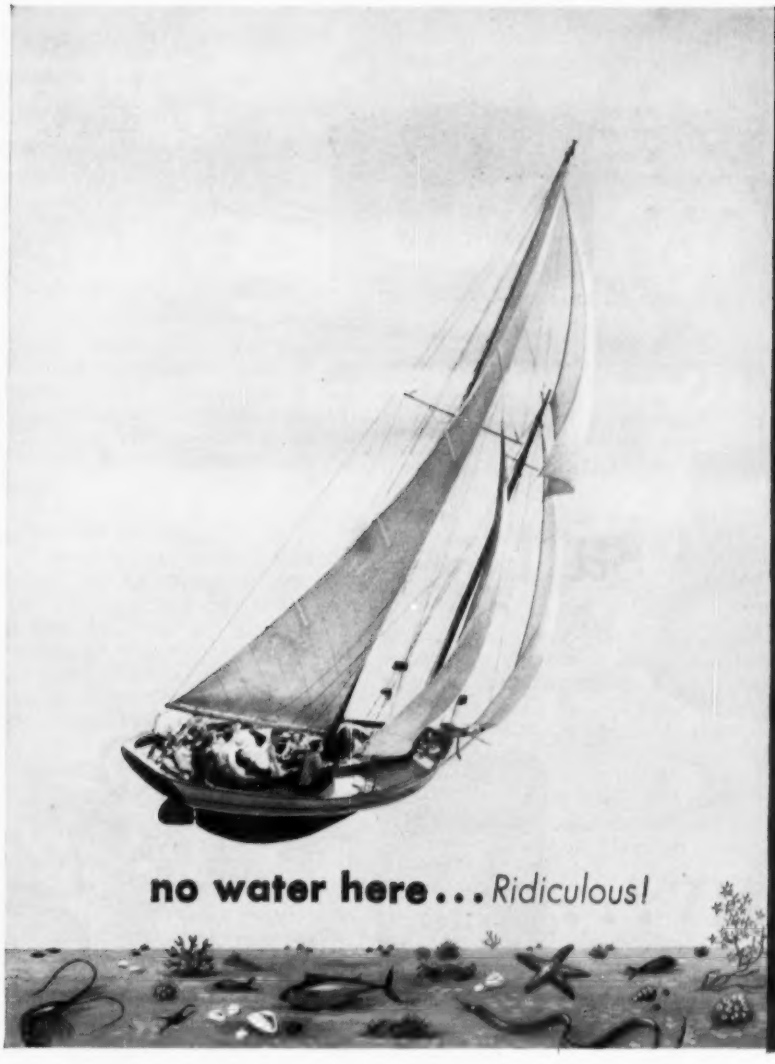
Chopper-Pump Unit takes products such as tomatoes, potatoes, and cored apples directly from inspection table. Items fed to parallel knives rotating through a grate, then conveyed to sanitary centrifugal pump via 5½-in. bottom spiral.—*Chisholm Ryder Co., Niagara Falls, N. Y.* (156C)

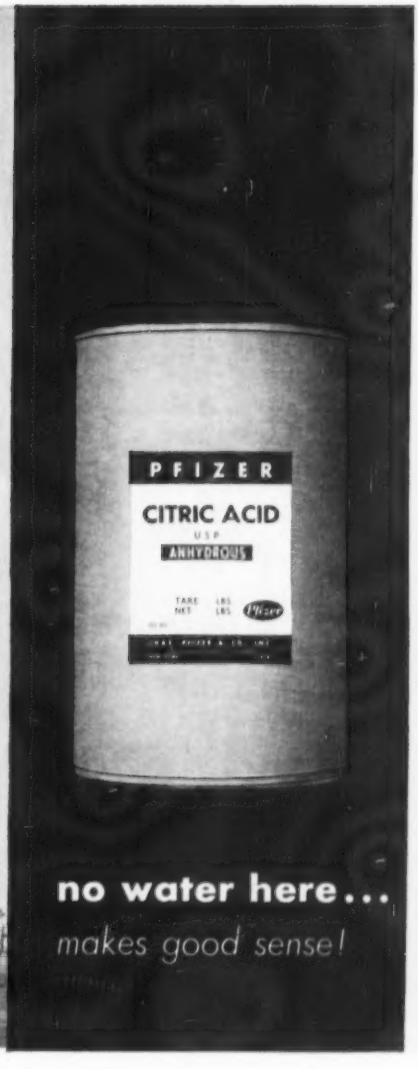
Glucose Oxidose in quick-dissolving form produces a clear solution in tap water, eases preparation of stock solutions. Enzyme is now seen applicable as an antioxidant for beverages.—*Takamine Laboratory, Inc., Clifton, N. J.* (156D)

Cheese Color reference standards consist of ten permanent wax color plugs mounted in transparent lucite carrier. Sample is passed through various openings and compared with adjacent colors.—*Milprint, Inc., 4200 N. Holton St., Milwaukee.* (156E)

Gravity Wheel Conveyors made of aluminum offer low maintenance cost, high strength, and easy portability. Units are available in 5, 8, and 10-ft. sections in 12 and 18 in. widths, plus 45 and 90-deg. left and right hand curves. Wheels are 2-in. dia. cadmium-plated steel or aluminum, grease packed.—*Sage Equipment Co., 30 Essex St., Buffalo, N. Y.* (156F)

Flexible Air Conditioner combines heating, ventilating, and cooling units in an insulated galvanized-steel casing. In this forced air system, room conditions are automatically controlled by fresh and recirculated air dampers, face bypass coil dampers, and Freon or chilled-water refrigerant section. All air passes through permanent, washable-type filters. Capacities range from 3,500 to 20,000 cfm.—*King Co., Owatonna, Minn.* (156G)





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Persuading the casual shopper to buy your out-of-the-ordinary foods calls for out-of-the-ordinary packaging. At Continental, our designers and lithographers are past masters at making your package look as colorful and tempting as its delightful contents. Let us give you all the attractive cans you need, exactly when you need them. And if you'd like help with research or engineering, you'll find it available at a moment's notice — suited to your individual problems. Call Continental soon. You'll be glad you did.

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Impact-In-Air Grinding

—Continued from page 69

tion of higher quality pepper, which is now being passed along to the customers as a premium product—yet at no higher cost. For management, here, has always staked its success on quality, maintaining a hard-boiled attitude toward cut-rate competition.

Attention-arresting is the compactness of the new, fully automatic size-reduction system, which has been operating a little over two years in this progressive spice plant. The compactness is especially noticeable when the new equipment is compared with the conventional 4-roll mill.

Now let us note how this benefit-packed system operates:

Whole black-pepper berries are discharged into a floor-level of feed hopper and, from here on, no further manual handling is required. A bucket-type elevator lifts the berries into a controlled-feed mechanism that then directly delivers them into the impact-in-air mill.

Here in the mill, specially designed uniquely-spaced blades* grind the pepper berries. The blades are constructed of a material that is capable of withstanding the abrasiveness of pepper berries.

Ground pepper now drops into a hopper that feeds a second bucket-type elevator. From this elevator, the ground pepper is discharged into a vibrating-type shaker screen. Coarse tailings are scalped and returned to the mill's feed mechanism for re-grinding.

Screened, finished product, on the other hand, continues directly to the filling line, ready to be packed either into drums or consumer-size packages. Uniformity, combined with a clean appearance, is thus assured.

Extreme flexibility in obtaining particle size is achieved by a simple screen change. And fines are controlled by the shape of the blade and their spacing, rotor speed, screen mesh, and rate of feed into the mill.

For various grinds, the number and speed of the blades will vary, but conventional installations will employ between 16 and 32 hammers (see drawing). The speed is such that for coarser grinds, it might go as low as 960 impacts per second. Finer grinds and higher production rates are obtained by going to 1,920 impacts per second.

Outcome is the production of a clean, A-1 quality ground pepper of a variety of sizes—"eights," coarse, regular (shaker type), or fine.

One special application of this new system is to pass decorticated pepper through a 100-mesh screen to produce a fine pepper for spicing soups and sauces.

End (Resume reading on page 70)

* The terms "blade" and "hammer" are used interchangeably. When these units have sharp edges, they are called "knife" blades or hammers. When flat or blunt, they are "impact" blades or hammers. In this present application, the impact-edge blade is used.

How Ultrasonics Shape Up

—Continued from page 82

with its length along the axis of the beam.

The radiation chamber used in quantitative bactericidal work must also possess certain unique properties. It must be sterilizable with heat and allow nearly perfect transmission of ultrasonic waves.

Numerous plastic materials were investigated with this in mind, and neoprene or rubber latex compounds were finally selected as best meeting these requirements. Chambers were then made to fit the uniform region of the ultrasonic field, and an appropriate mount was built to support them in proper position in the field. Degree of perfection achieved in transmission of ultrasound is illustrated here in graph form, which shows horizontal and vertical profiles of the field with and without the chamber in place.

Finally, a survey of the literature revealed the need to control the following bacteriological variables: Type of organism, its age and growth history, concentration of the organism, and chemical composition and physical properties of the suspending medium.

While some preliminary runs have been made on suspension of *Escherichia coli* in phosphate buffer, the data are insufficient to establish any quantitative conclusions. However, we feel confident that by following this approach we shall be able not only to place bactericidal effects of ultrasound on a quantitative basis, but also to secure information as to how the bacteria are killed.

Most of the work being done with ultrasound is still in the experimental stage. But some applications have, at least, been successful on a laboratory scale. A patent[8] has been issued for homogenization of liquids, including milk, by means of ultrasonic treatment. While this is satisfactory for some liquids, such treatment of milk produces a "hot-oil" rubbery flavor which is objectionable.

This process has been under investigation by Winder and Burger[9] at the University of Wisconsin. They

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Highly popular general cleaner especially useful on all wood and metal surfaces, tile, concrete floors, general processing equipment, ovens, hoods, etc. Rapid removal and dispersion of grease and heavy soil. Leaves no scum; rinses freely. Safe for hands.

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Non-corrosive organic acid detergent for cleaning high temperature equipment. Completely neutralizes and removes baked-on mineral deposits. The latest scientific approach to lime or "stone" dissolution. Eliminates abrasive methods.

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Concentrated sodium hypochlorite solution for bactericidal use in food plant operations. Rapid and effective for sanitizing all types of equipment. Clear solution, always ready for use. No dissolving or settling necessary. Leaves no sediment or residual film.

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noted that cavitation appeared to be necessary for homogenization of milk, which was accomplished at relatively low acoustical intensities. They also noted that development of the oxidized flavor defect was retarded by ultrasonic treatment, probably due to removal of oxygen during cavitation.

Another application in the dairy field is the preparation of cream cheese mixes. A German patent[10] proposes sonic treatment for prechurning of cream prior to manufacture of "Fritz" butter. Another German patent[11] suggests use of ultrasonic waves to secure a finer dispersion of moisture in butter, with possible improvement in keeping quality due to decrease in microbial growth.

Further, removal of whey or water from cheese or other protein-containing materials by ultrasound is the subject of still another German patent.[12] It is claimed that moisture content can be adjusted by proper selection of frequency and intensity.

Equipment for ultrasonic acceleration of the ripening of cheese using barium titanate elements is being investigated by Winder and Nelson.[13] Their studies indicate definite acceleration of the aging of cheese and that, in the treated cheese, it is the biological systems which are most affected.

Other Uses

Sugar. In sugar processing, effectiveness of ultrasound in destroying undesirable enzymes has been investigated. And cane sugar has been partially converted to invert sugar.[14]

Starch. Stable suspensions of potato starch have been sonically prepared by Chambers and Gaines.[8]

Brewing. In the beer field, ultrasound speeds extraction of hops.

Cereals. In grain storage, it has been applied to destruction of weevils.

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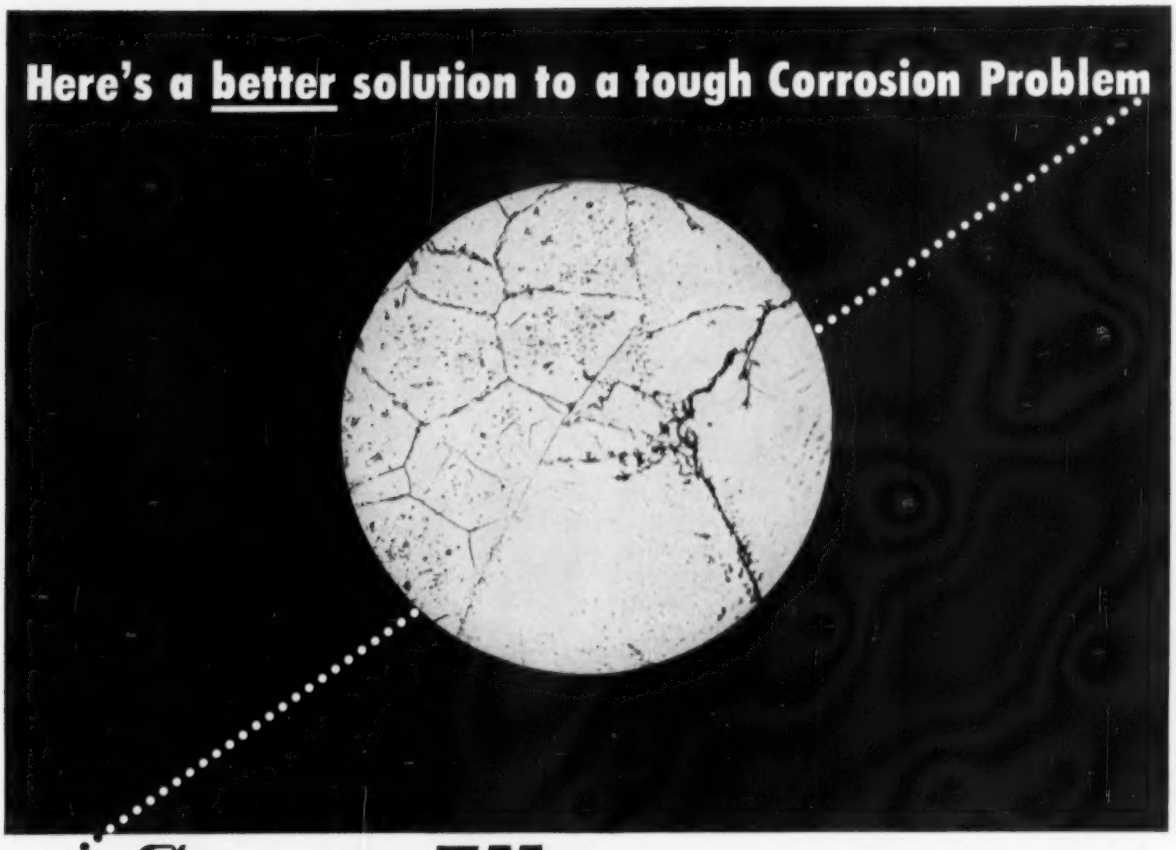
End (Resume reading on page 82)

Here's a better solution to a tough Corrosion Problem



Carpenter 7Mo Stainless Tubing & Pipe

The corrosion-inviting cracks in the right-hand section of the photomicrograph above end abruptly as they near the center of the picture . . . and that quick ending may help you find a quick ending to stress corrosion cracking problems.

The picture is Carpenter 7Mo stainless pipe (left) welded to a Type 316 fitting. It is still unaffected by the stress corrosion cracking that has destroyed the usefulness of the fitting. The pipe outlasted three such fittings before the photomicrograph was made.

The stout resistance of Carpenter 7Mo to stress corrosion cracking, even in the presence of chlorides or other caustic and sulphite solutions, is coupled with excellent resistance to general corrosion and pitting. It has been used as a "problem solver" in food and chemical processing plants, pulp mills, petroleum refineries and other places. There may be a profitable place for it in your operation. We'll be glad to work with you, aid you in investigation of your problems and a possible 7Mo solution.

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NEW PACKAGES & PRODUCTS

Economy, Convenience Stressed in New Baby Foods

A wave of new products and packages for its line of baby and junior foods has been released by H. J. Heinz Co. Ranging from smaller packages for cereals to the use of jars for strained meats, the changes are directed at answering demands for economy and convenience.

All four of the processor's cereal products—pre-cooked oatmeal, barley, rice, and mixed cereals—are being packed in a new 3½-oz. carton as well as the regular 7-oz. package. The packages feature attractive new labels, four-sided printing, and a colorful back panel that lists other Heinz products.

The new package is not designed as a replacement for the standard large package, but will enable mothers to vary their babies diet more conveniently. This permits concurrent use of more than one variety without causing waste.

A Heinz baby gift of assorted cereals offers a package containing four ½-oz. cereals cartons. These are automatically filled and fed into a preformed lock-type mailer carton. The outer carton is sealed and it is possible to day-code the outer carton automatically at the time of sealing.

First to pack strained and junior meats in glass, Heinz has added Junior Pork to its present line of products for older babies, previously introduced were beef, beef heart, veal, and lamb. The Junior foods feature a larger particle size that serves as a bridge between strained foods and adult fare. For infants, Heinz has added strained chicken in glass jars to its popular line of strained foods which includes beef, liver and bacon, lamb, liver, beef heart, pork, and veal.

Use of glass instead of cans is cited by Heinz officials as the result of "an overwhelming preference by mothers for meats packaged in glass jars".

A horse-shoe shaped teething biscuit has been introduced by Heinz in several market areas. The new biscuit is just the right thickness for infant fingers and is baked very firm. Specially suitable for babies between four and seven months, the biscuit will even interest children beyond that age.

Ingredients include whole wheat flour, brown sugar, soy flour, corn syrup, honey, eggs, defatted milk, solids, wheat germ, and salt.

The biscuits are packed twelve to a box. The package is a re-usable fiber cylinder with metal ends. A colorful aluminum foil label and pull string feature for easy opening add to eye appeal. The label art follows the style used on the company's strained and junior baby foods.

Latest Heinz product for toddlers is creamed carrots, bringing the total number of junior foods to twenty-five.

For the Grownups

A blend of distilled white, rex amber sugar, and malt vinegars, Heinz's salad vinegar has just gone into national distribution. The vinegar is packed in pints and quarts.

A 15¼-oz. can of Creole-style macaroni with mushrooms will also be marketed nationally. The tasty product features large mushroom slices, tomato sauce, and peppers, and is an ideal luncheon or Lenten food.

Dehydrated horseradish, a modification of the company's first product, features strength and flavor retention for years in any climate. The product is packed in a 2¼-oz. jar and is ideal for serving with boiled beef and other meats. It is twice the strength of ordinary horseradish.

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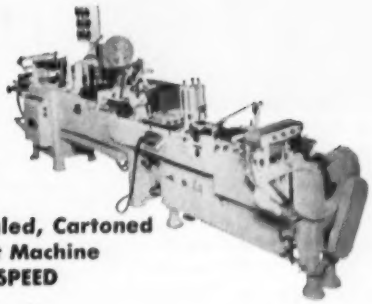

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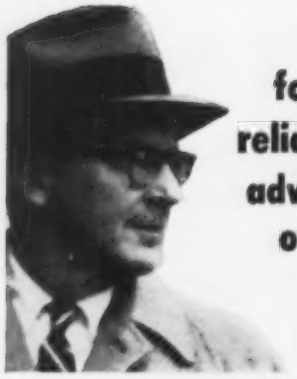

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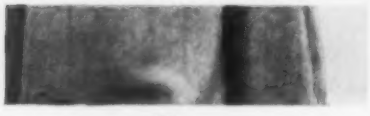

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SHOW HIGHLIGHTS are illustrated above. In foreground are Minute Maid's new dietetic Tango Cocktail, and Ar-Kay's frozen pierogies. In second row are Val-Lo-Will's foil container and lid for pot pies, Chet's carton holding two chicken tamales, and Mah's new shorter egg rolls. In third row are Little Bo-Pizzas (miniature pizzas), Chet's chicken and turkey ravioli with sauce, and Sergeant Marty Snyder's carton of eight chicken and turkey sticks. In last row are new fiberboard containers with metal ends used by Ar-Kay for their frozen soups, and a turkey pie made by Clark's Ranch Kitchen.

Frozen Horseradish, Shrimp Pie, Spark Show

The National Frozen Food Merchandising Convention Exposition, held in Chicago, in March offered many novel ideas–both in packaging and new products–for processors. Here are some of the highlights spotted at the show:

Ar-Kay Foods Co., Detroit, is packaging its frozen soup line in fiberboard containers with metal ends. The line includes bean, potato, beef noodle, and split pea. Each package contains 1-lb. of frozen soup which serves two people. The same processor is packaging frozen pierogies in cello-overwrapped trays. The product is a dumpling popular in the Pennsylvania Dutch region.

A package containing eight southern fried chicken and turkey sticks is being processed by Boneless Turkey, Inc., New York City. Using the "Sergeant Marty Snyder" brand name, the sticks do not require defrosting, need only be heated before serving.

Minute Maid's Tango Cocktail–a special blend of tangerine, orange, and other juices–makes a bid for the diet-conscious consumer. Each 6-oz. can makes 1½-pts of juice.

A chicken pot pie packed by Val-O-Will, Lake Geneva, Wisc., differs from standard pot pies in that a top lid is sealed to the foil container. The product is packed in the usual wax-paper overwrapped carton. A turkey pie packed by Clarks' Ranch Kitchen, Azuza, Calif., is made without vegetables.

Chicken on a Stick

Resembling ice cream sticks, a unique Chik Stik is being processed by Frozen Farm Products, Altoona. A tasty chicken croquette, the product is made with standard ice cream stick machines.

Among the many frozen pizza products exhibited at the show, Nino's Pizza Snax attracted attention with its idea of providing four individual pies in one package. Two of the pizzas are made with mozzarella and two with anchovies. A pizza processed by Crispy Pizza Crust Co., Inc., uses a cheese blend of Romano and Parmesan, and cuts preparation time to 4-6 min. Packed under the Crispy Pete label, the pie is directed at the institutional trade.

Marvell Foods, Inc., Chicago, offers a frozen shrimp creole pie. The ready-to-bake item contains whole shrimp in a spicy sauce.

A frozen cranberry orange relish is ideal for meat, fish of fowl. A combination of cranberries, and oranges, the relish is processed by Cranberry Growers, Inc., Wisconsin Rapids.

Junius Food Products Corp., Chicago, is packing frozen horseradish in cans. The freezing is reported to retard discoloration and aid in retaining flavor and strength.

For the connoisseur are the six new frozen sauces by Maxim's de Paris, Inc.: Armoricaine, Ile de France, Champagne, Marchand de Vin, Diable, and Cumberland. Each sauce is designed for a specific dish.

French-fried frozen onion rings were introduced by Readi-Frozen Foods, Inc., Savannah. The ready-to-heat-and-serve rings are packed in a 4-oz. carton overwrapped with waxed paper.

Prominent among the suppliers exhibits were Sealright Co.'s new paperboard cups for frozen foods. These feature a vinyl coating which permits the freezing and even baking in the cup.

More Frozen Dinners

C. A. Swanson & Son's double fruit pie carton was on display at the show. Made in apple and cherry, the pies need only be browned before serving. Latest Swanson TV Dinners are ground beefsteak, fried shrimp, baked ham, and beef pot roast. Also in the complete dinner vein were Chicken of the Sea's tuna dinner, with mashed potatoes and peas, and Chun King's Cantonese dinner with chop suey, rice, and egg roll.

Chet's Famous Foods, Eugene, Oregon, offered frozen chicken tamales and chicken and turkey ravioli with sauce. Both products are packed in cartons featuring reproductions of the prepared food.

Cantonese Egg rolls that are slightly smaller than usual are being packed by Mah Chena Corp., Chicago, in a bright silver, red, and yellow foil-wrapped carton.

Winner in Carton Competition

First prize in the food division of the Annual folding carton competition was awarded to the Thomas J. Lipton 100-unit tea bag carton. The box is produced by Alfors Cartons, a division of Continental Paper Co. The carton was judged on product protection, identification, convenience, sanitation, economy and sales value.

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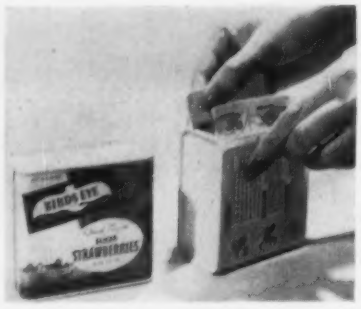


New Side-Opening Can

More economical packing, improved quality, and more sales appeal are the aims of a new frozen food package designed by American Can Co., New York City. The composite container is made of fiberboard on which the label is lithographed prior to forming the rectangular carton. This differs from the "dip" composite carton where the label is attached after freezing.

A special feature is its side opening. A flap permits the consumer to remove the contents easily and neatly.

The can is lined with a special protective substance, reported by the manufacturer to be more effective than previous coatings. The lining practically eliminates moisture or syrup absorption inside the body of the container.

The 10-oz. container was successfully tested by General Foods' Birds Eye Division, who reported the container as being suitable for high speed production on the plate freezing and packing assembly lines, and stated that it did not require any alteration in their equipment.

The new package is also suitable for the blast freezing technique.

Circle 166A on Reader Service Card

Brighter Look for Boxes

Corrugated paper cartons with a lighter, smoother finish have been perfected by Hinde & Dauch Paper Co., Sandusky, O. Marketed under the trade name Corabrite, the product is smoother than natural finish kraft and offers a better surface for rubber plate printing.

The manufacturers are emphatic in their statements that Corabrite is not a special white or colored finish, but would appear on regular factory runs. The new material has high color uniformity, reducing normal color variation by 80%, and is reported to be much stronger than conventional kraft.

Circle 166B on Reader Service Card

Potato Salad with Weiners

Said to be the first to offer canned German-style potato salad with weiners, Hipke Foods, Inc., Mt. Calvary, Wis., is marketing this product under brand name of Tante Gretchen.

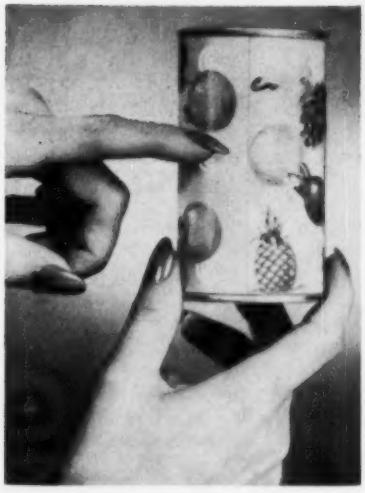
Prepared from an old and secret recipe, salad contains small sliced potatoes, cubed bacon, sliced weiners, cubed red and green peppers, onions, and special sauce.

At present it is being marketed in 1 lb. cans only.

One-Step Cake Mixes

Three one-step instant cake mixes have been marketed by General Foods' Swans Down: White, yellow, and devil's food. Reported as the only mixes that require only one mixing step, the products reduce normal preparation from eight minutes to just three minutes. The mixes also feature a tolerance to slight mixing and beating variations. This guarantees the consumer more successful cakes. The mix is prepared by adding fresh eggs and water, beating for three minutes, and then baking.

A new package design features a large white swan on a red background, with large one-slice illustrations of the cake.



Solderless Can for Juice

Reported as the first solderless food can for frozen concentrated juices, a new Continental Can Co. development allows use of the complete can circumference for the lithographed selling label.

The result of two years of research, the can's seam is joined with a newly formulated cement. Commercial tests of the can show it to be rugged and able to withstand high speed packing and handling. The all-round label surface adds to the eye appeal.

Circle 167A on Reader Service Card

Frozen Donuts Introduced

Introduction of Minit-Fresh frozen donuts by Chicago Frozen Donut Co., Waukegan, will enable consumers to eliminate the mess and bother of preparing donut dough at home. Rings of uncooked dough are packed eight to a package, and are ready to fry only 90 seconds from freezer to table.

The donuts are prepared by frying at 350 deg. F. in vegetable oil or fat.

New Product Shorts

Adds Rice Cereal for Babies

Beech-Nut Packing Co. has added a cooked rice cereal to their baby food line. Product is packed in a 4-oz. package with pouring spout.

Italian-Style Canned Ravioli

V. LaRosa & Sons, Inc. is processing canned Italian-Style ravioli in sauce. Can size is 15½-oz.

Pre-Mixed Pie Topping

Requiring an addition of water and a few minutes of whipping, a new pre-mixed egg white pie topping is being marketed by Billings & Gage Mfg. Co. Called Instant Cake Topping, it is economical and gives uniform results.

Decolorized Oleoresin in Black Pepper

Fritzsche Brothers, Inc., is processing a decolorized oleoresin black pepper, which is a light yellow instead of the usual green.

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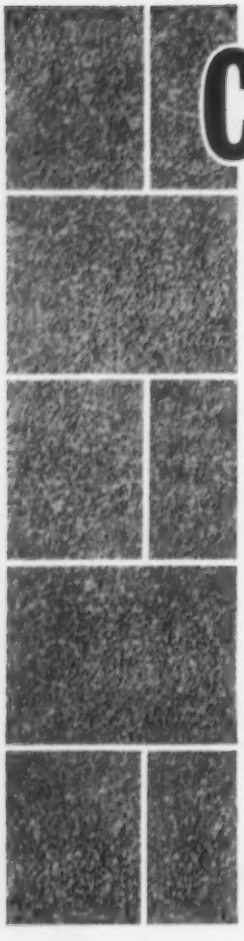

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Bridges Way to Expansion

—*Continued from page 98*

Here, the flour is also moved into one of the six bakery storage bins via gravity Airslide action and rotary valve assembly employed with the pneumatic handling system.

Operating under a pressure of about 8 psi., the flour goes through a rotary, eight-pocket feeder to one of six adjacent 3-in. pipes feeding a storage bin.

Entire foolproof Airveyor system is interlocked so as not to operate until relief valve atop the bin is manually opened and explosion-proof microswitch at pipe hook-up station is actuated.

Operation is air-controlled by trailer operator from a panelboard. The board has three green lights. One goes on when the truck is hooked up to unload and the other when the pressure relief valve at the bin is open. When system is clear, operator pushes a start button to operate the dust collector, and the third green light glows.

To indicate which bin is being filled, one of six white lights comes on. And, when it is full, a Bindicator automatically stops the pneumatic system through a relay switch. Simultaneously, a red lamp lights and a buzzer sounds.

A separate vacuum system serves the top of the bins. Incoming flour passes through distributing nozzles, drops into bins, and dust passes off through vacuum tubing into a dust collector to go back into the loading system.

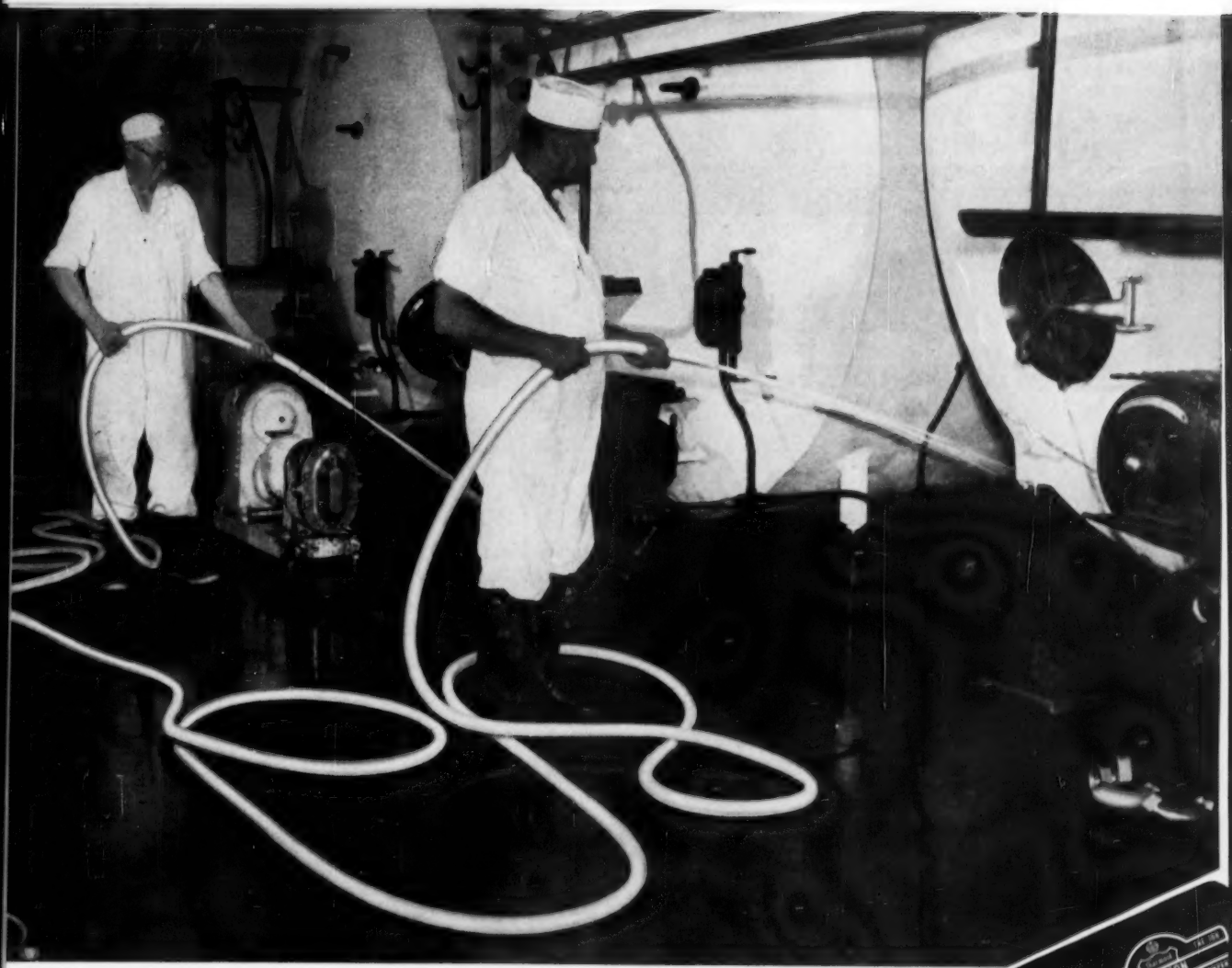
Movement of flour from the bins is through an interlocked Link-Belt bulk-flow conveyor for a distance of 145 ft. through an Allis-Chalmers gyratory sifter. From this unit, it is fed through an Entoleter and into two storage bins—one for clear and the other for patent flours.

The patent-flour bin is equipped with a high-low Bindicator, whereas the clear-flour bin is pushbutton-filled until the flow is automatically shut off by a high Bindicator.

As a safeguard, a control panel designed by Omar engineers has been installed for feeding flour into the two holding bins either manually or automatically. An indicator switch on the panel can be set to operate for either clear or patent flours.

Acknowledgement — the drawings used in this article are from chief draftsman, Milo Holub, Omar central engineering department. Photos 1, 5, and 6 are from Union Steel Products Co.

End (*Resume reading on page 99*)



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WHY SHOULD THE VITAMIN C CONTENT OF FRUIT AND VEGETABLE JUICES BE STANDARDIZED?

Because nutrition reports disclose that—

- **Vitamin C deficiencies exist throughout the country***
- **Scurvy has not disappeared from the United States***

Proof of deficiencies among adults and children. You should know these facts!* Diet surveys from Maine and Vermont, New York, Illinois, New Mexico, Oregon, West Virginia, and Texas show a definite pattern of inadequate vitamin C intake. These studies covered grade school and high school children, college men and women.

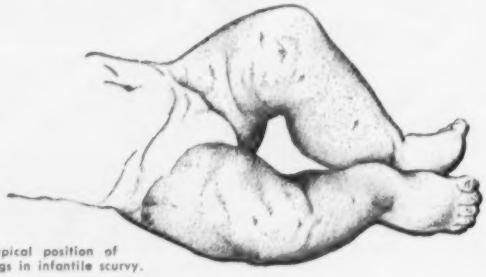
Spongy, swollen gums symptomatic of scurvy.

From these studies* of dietary habits and physical conditions there is considerable proof that many of the children and adults covered by survey have actual, physical symptoms of vitamin C deficiency.

Infantile scurvy. Scurvy* occurs, even today, among infants who are artificially fed. Fortunately the disease may be cured by the administration of vitamin C. How much more sensible it is to prevent it by supplying these bottle-fed infants with the daily allowance of 30 milligrams of vitamin C as recommended by the Food and Nutrition Board of the National Research Council for children under one year of age.

Symptoms of infantile scurvy are fretfulness and fear of being touched.

These bottle-fed infants, unless receiving a pediatric prescription containing vitamin C, are largely dependent on supplemental ascorbic acid which they receive from fruit or vegetable juices. Unless fortified with vitamin C many of the processed juices may not supply these babies with adequate quantities of this essential element.



Typical position of legs in infantile scurvy.

What can be done? Because of the increasing evidence that American diets are deficient in vitamin C, leading nutrition experts believe that processed fruit and vegetable juices, on which the public is so reliant for its supply of this necessary vitamin, should contain the "Vital Ingredient."

The Vital Ingredient of any processed fruit or vegetable juice is a *dependable* and *adequate* supply of vitamin C. You can give your juice this ingredient by *standardizing its vitamin C content*. The processing is simple and the new low cost of ascorbic acid makes juice standardization more attractive than ever.

With ascorbic acid available *by the tons* at extremely modest cost fruit and vegetable juices can have a standardized vitamin C content for the better protection of the nation's health and well-being.

*Statements are based on documented reports. References on request.

Illustrations after photographs in The Vitamins in Medicine by Bicknell and Prescott, Third Edition, published by Grune & Stratton, Inc., New York.

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ADVANCES IN TECHNOLOGY

Stabilizing Apple Wine

Oxidation and acetic acid development in apple wine may be controlled by addition of small amounts of glucose oxidase and catalase.

Flavor of resulting wine is superior to that stabilized by pasteurizing or addition of SO_2. However, a slight discoloration quickly develops. But, as the wine ages, its color becomes similar to untreated wine. Amount of enzyme preparation found most effective was 0.15%—*Food Research*, 42-46, Jan-Feb, 1955.

Preserving Peeled Potatoes

Inhibiting enzyme action without use of heat, and thus extending the shelf life of peeled whole and sized potatoes (both sweet and white) is the object of a recently patented process.

In it, advantage is taken of phosphoric acid's capacity for destroying enzymes, and its ability to catalyze the bleaching action of bisulfite.

Used is a solution comprising: Water, 94-98%; phosphoric acid, ½-4%; propylene glycol, ½-1½%; sodium benzoate, 1/20-1/10%; sodium metabisulfite, 1/20-1/10%.

Potatoes are processed at room temperature by submerging in solution at 50-115 F. for 10-100 sec. Process is claimed applicable to other vegetables, and to fruits—U. S. Patent 2,700,613, Jan. 25, 1955.

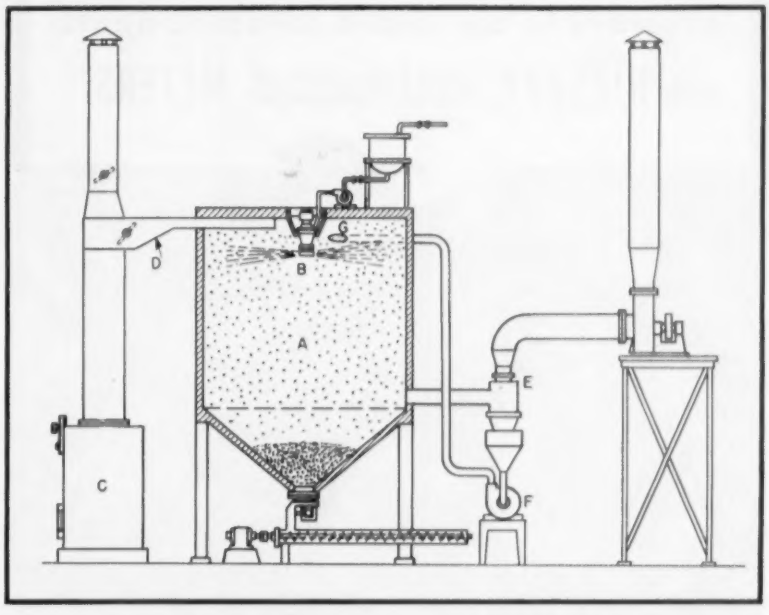
Dry Vinegar Composition

Preparation of a dry imitation vinegar that, when dissolved in water, will yield a table vinegar having the taste and nourishing qualities of the natural product is covered by a recent patent.

Product can also be added to dehydrated foodstuffs such as tomato juice, onion powder, mustard, pepper, or soy powder, enabling production of rehydrated condiments.

Process comprises adsorption of glacial acetic acid and pure fruit essence on solid binder of malic acid and dry sugar. Preferred sugar is lactose. Sucrose or dry glucose are also satisfactory. For making different types of vinegar different fruit essences are used—apple for cider vinegar, grape for wine vinegar.

Composition can be molded on conventional tableting machines, and coated with water-soluble, tasteless coating substance to prevent crumbling. Tablets should be packaged in tubes of non-corrosive metal, glass or plastic, or wrapped similarly to candy. By substituting l malic acid for the dl product, a paste is obtained—US. Patent 2,696,441, Dec. 7, 1954.



Improved Spray Dryer Gives Granular Product With Non-Caking Properties

An apparatus and method for spray drying in such a manner as to provide nuclei for solid granules as formed, convert dust from drying operation to granules, and coat their surfaces with the dust to decrease adhesion is the object of a recent patent.

In the operation, solution or suspension of material to be dried is fed to chamber (A in drawing above) and distributed by centrifugal atomizer (B). Air, heated in furnace (C) is delivered to chamber through duct (D). Dried granules fall to cone bottom of chamber and are removed.

Dust is carried in air stream to cyclone (E) where it is separated from the moist air and moves down to blower (F) that returns it to drying chamber at (G). Here, it intermingles with the incoming hot air, and liquid to be dried. This results in its incorporation in granules of the principal product. At the same time, the fines coat the solid granules and thus prevent caking.

System is also applicable for incorporation of small amounts of chemicals as in the case of black strap molasses, where ¼-1% precipitated tricalcium phosphate is introduced by means of blower (F) to produce a free-flowing, non-caking product — U. S. Patent 2,698,815, Jan. 4, 1955.

Detection and Control of Flat Sour Organisms

Effectiveness of the can sample method for locating foci of infection of flat sour organisms has been demonstrated over a 2-yr. period on a cream-style corn line.

Two sampling methods were used: Culture, and can-sample. Samples for culturing were collected directly and by swabbing suspect areas. Can samples were taken at five different locations on the line.

The first season's cultural results failed to indicate the foci of infection, although flat sour organisms were isolated one day from the filler bowl and cut-off plate.

The following season major emphasis was put on can samples collected at several places along the filling line, and the results incriminated the filler as the focal point. Treatment of the filler bowl with a caustic-detergent solution caused the surface to turn

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brown, ultimately revealing a tough film that had the appearance of a baked-on lacquer coating. Culture of this material showed the presence of flat sour spores.

As a result of this discovery it was decided to use the caustic cleanup procedure on all cream-style corn fillers after each day's run. Effectiveness of this procedure was demonstrated early in the third season when no flat sour spoilage was detected in 576 can samples of the product—National Canners Assn. convention, Feb. 19, 1955.

Internal Corrosion of Cans

Studies on effect of steel-base composition and of tin-coating weight on internal corrosion of cans indicate that both may be at fault, depending on the conditions.

It is felt, for example, that heavier tin coatings should yield more corrosion-resistant tin plate. But certain data on grapefruit juice fail to substantiate the expected relation between tin-coating weight and shelf life. For a given steel, increasing the tin-coating weight increases the shelf life; but the erratic results obtained with tin plate made from different batches of steel show that some of the differences must be attributed to the steel base.

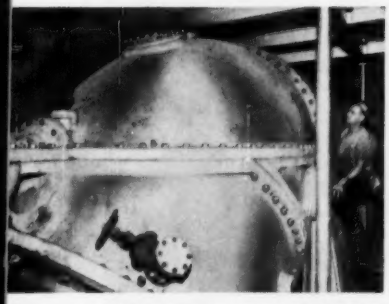
Steel base may differ in composition and in processing. The phosphorus content and the presence of tramp elements such as Cu, Ni and Cr cause the main differences in grade. Phosphorus and Cu are the factors most influential in modern can corrosion. In numerous investigations the deleterious effect of P is evident in every instance. The influence of Cu is not so clear cut, although low-Cu steel is preferred.

For maximum corrosion resistance, the first essential is correct steel composition; the second is the tin-coating weight. The tin plate manufacturer controls the processing through the various steps of production in such a manner as to attain maximum corrosion resistance of the particular grade of tin plate. Better protection of the steel base by the tin coating is the promising field of research—National Canners Assn. convention, Feb. 20, 1955.

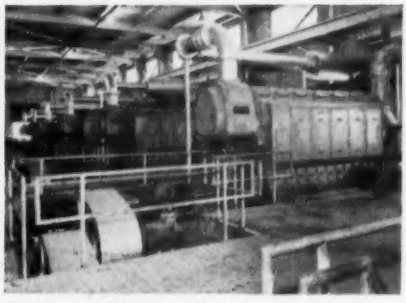
Check Insecticide Residues By Simplified Bioassay

Modification of the Hoskins bioassay for insecticide residues in food products has resulted in a procedure adapted to routine analysis of large numbers of samples where speed and simplicity are of relatively greater im-

World's largest pumping station tames Everglades



Each giant 89-ton pump is equal to the floor space of the average-sized living room. The huge four-bladed, air-foil propeller moves water through the pump at the rate of 360,000 gallons a minute.



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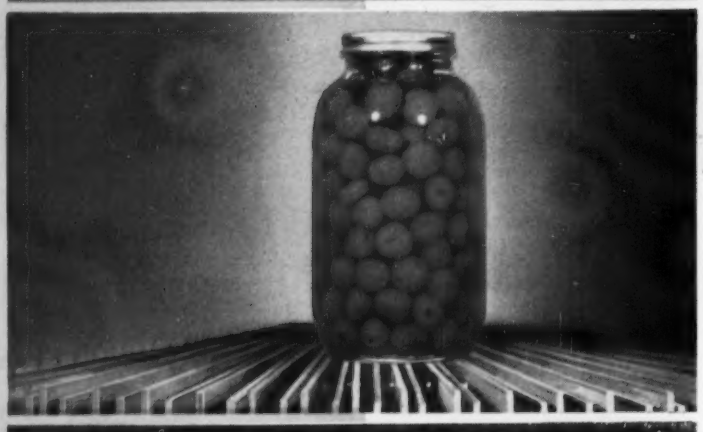

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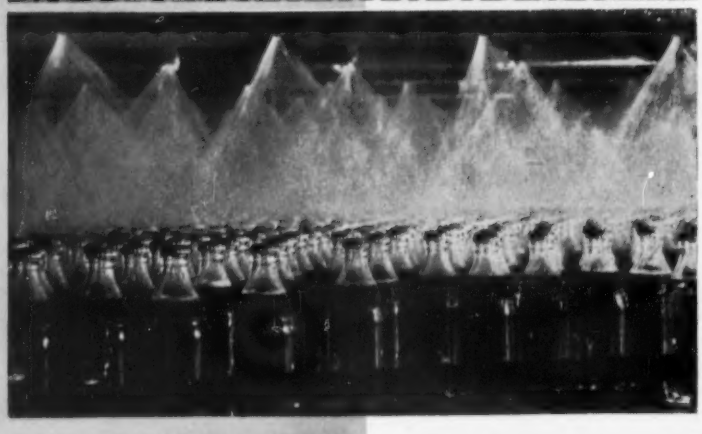

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portance than the highest degree of accuracy and sensitivity.

Adult flies for the bioassay were fed horsemeat as a source of protein and were kept in an incubator at 80 deg. F. with controlled humidity and continuous illumination. Departing from the Hoskins procedure of anesthetizing the flies and then exposing them to the insecticide in vials and transferring them to cages for the 24-hr. holding period, the simplified procedure exposes the flies in 250-ml. beakers and holds them there without transfer to cages.

Twenty female flies at least four days old are placed in each beaker, on the bottom of which the insecticide has been deposited by evaporation of a solvent solution of the sample. After holding at 80 deg. F. exposed to light for 20-24 hr. a count is made of the dead flies.

The procedure seems well adapted to the screening type assay most useful in a cannery control laboratory. It calls for simple equipment and does not require highly specialized training. And inasmuch as the toxicity of insecticides to flies is roughly proportional to their toxicity to humans, an arbitrary limit based on a known amount of a given insecticide can be used for screening purposes, even though unknown insecticides may be present—National Canners Assn. convention, Feb. 21, 1955.

Many Applied Pesticides Cause Flavor Changes

There is little doubt that benzene hexachloride and lindane produce undesirable musty and moldy flavors in food crops. The effect on fresh vegetables is not as severe as on canned products. Off-flavors are also more likely to develop after long storage than immediately after processing. These pesticides also affect the flavor of frozen and canned vegetables grown in the same soil one, two, and three years after application.

DDT seems to be without significant effect on the flavor of various canned vegetables. This is also true of such derivatives as aldrin and dieldrin, although undesirable flavors are more likely to appear in canned than in fresh or frozen vegetables. Chlordane applied at the rate of 16 lb. per acre or more has caused undesirable off-flavors in canned vegetables. Toxaphene gave varying results with four different vegetables.

Sulfones applied as miticide sprays on peaches and pears gave inconsistent results, though canned genite-treated peaches and applesauce showed serious off-flavors, as did fresh strawberries sprayed with genite.

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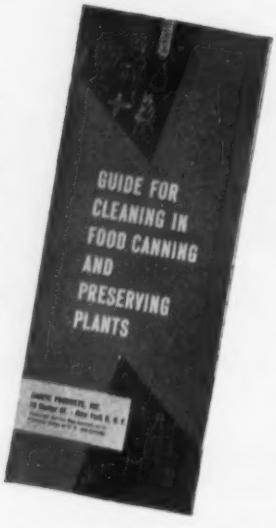

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So little study has been given to the effect of diphenyl carbinol derivatives that more observations are needed before reaching any conclusions. Flavor differences have been noted in treated fruits, especially when canned and stored for eight months.

Phosphates and thiophosphates rarely seem to cause flavor problems in foods, probably because of their volatility. In the most extensive study thus far made, differences in flavor were observed between treated and untreated samples, but these were regarded as due to variations in sweetness and maturity rather than to off-flavors caused by the pesticides. Again, the canned product showed the greatest difference, and storage had its effect.

Investigation of the flavor effect of the systemic pesticides has only recently been undertaken, but thus far no significant difference has been noted in vegetables treated with Systox. A slight off-flavor developed in canned apples after six months' storage—National Canners Assn. convention, Feb. 21, 1955

Effect of Ammonia On Tin Surfaces

Very low or very high concentrations of ammonia do not attack tin. Low temperatures and the presence of a protective oxide film also limit corrosion effects.

Tin coating on steel is less resistant than rolled tin, but, once corrosion by ammonia is started, the character and speed of the attack is much the same for all tinned surfaces. This corrosion can be made negligible by addition of hydrazine (one g./l.) or sodium chromate (0.1 g./l) to the solution. Without protection, corrosion of any tin surface is likely above 77 F in solutions containing 0.2-70g. ammonia per liter.

In 1 N NH_4OH (3.5%) at 86 F the tin coating of a plate of 1.5 lb. per base box (0.0009 in. thick) was removed in 3 or 4 days. Sodium alkyl sulfates detergents (8, 10, 12, 14 carbon atoms) can induce a point attack type of corrosion on pure tin rolled into sheets 0.15 mm. thick. Alkyl sulfate solutions rupture the oxide film of the tin and reduces its adhesion to the layer below, so that failures of the metal develop at these points.

Tendency to corrode in this way increases with chain length of alkyl group and with the number of the carbon atom on which substitutions occur. Below 0.001 *M* solutions the attack on the tin is light because of low initial adsorption. At higher concentrations (0.10-0.20 *M*) adsorption

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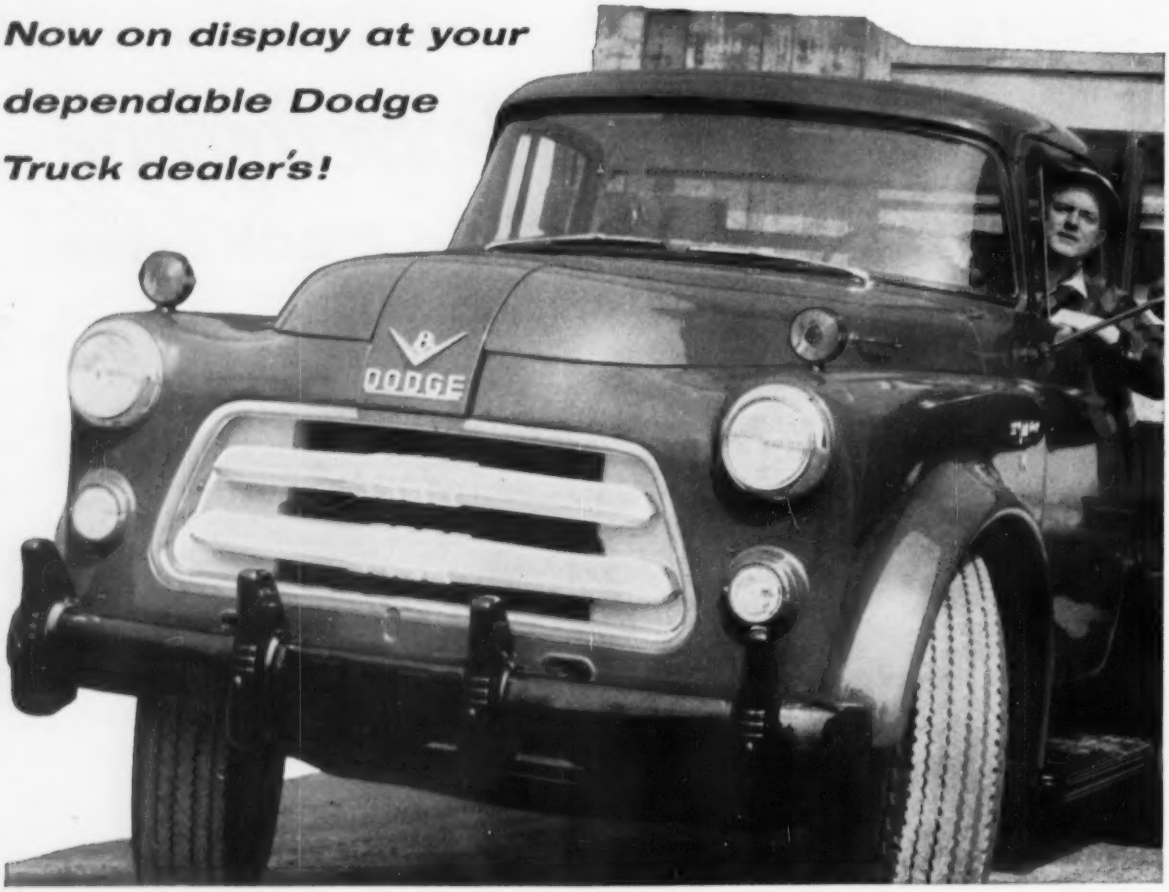


inhibition of the attack on the tin occurs. Symmetrical alkyl groups are less active in inducing this type of tin corrosion — *Journal of Applied Chemistry*, Vol. 5, No. 1, 1-9, 10-18, 1955.

Cocoa Butter Adulteration Spotted by Cooling Graph

True cocoa butters have characteristic time-temperature cooling curves that can be used to detect the presence of foreign fats. Two methods of obtaining curves give satisfactory results.

In the method of Pichard the melted fat is cooled in a Dewar flask immersed in an ice bath. Beginning at 105 F the temperature is taken every 2 min. The cooling curves of cocoa butter mixtures (even when Borneo tallow is added) are displaced upward (along the time axis) and are readily distinguished from those of pure cocoa butter.

The crystallization decay method of Vaeck uses only about 1 g. of fat and a capillary U-tube half-filled with the fat and sealed at both ends. After melting the fat, tube is transferred to a controlled temperature (50-75 F) bath and time required for clear fat to cloud along total length of tube is noted. By repeating the determination at several temperatures, time-temperature curves characteristic of the fat are obtained.

While both methods permit certain detection of 20% additions of substitutes that have been investigated (except Borneo Tallow or Illipe), the crystallization decay method is faster, takes less material, and is independent of the apparatus used. The Pichard method is slightly more sensitive in some cases—*International Chocolate Review* 1955, No. 1, 14-21.

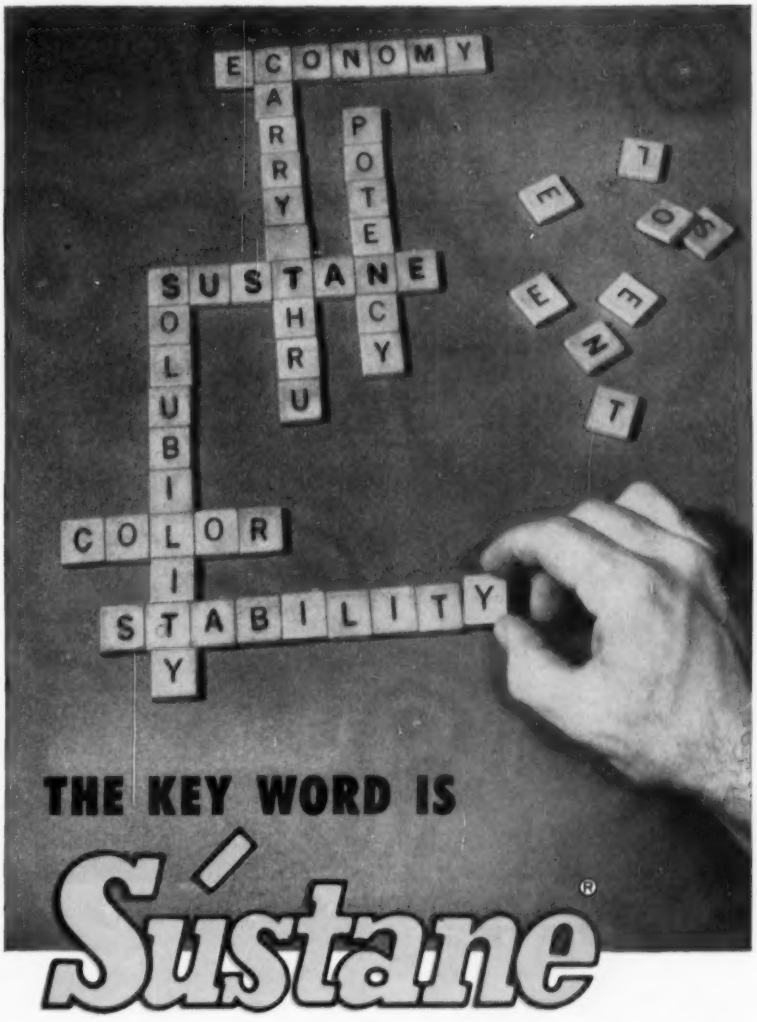
Antibiotics Seen Extending Storage Life of Fish

A satisfactory means of prolonging storage life of fish by the use of relatively low concentrations of antibiotics is indicated by recent experiments.

In these, it was found that chlorotetracycline (aureomycin) and hydroxytetracycline (terramycin) have a definite preservative effect on fish fillets but none on shrimp at the concentration used.

The mixture of fumaric acid and sodium benzoate known as Fran-Kem had some preservative effect on fish fillets, but none on shrimp. Neomycin had no preservative effect on either fish or shellfish.

Further evidence was obtained of the efficacy of the VRS (volatile re-



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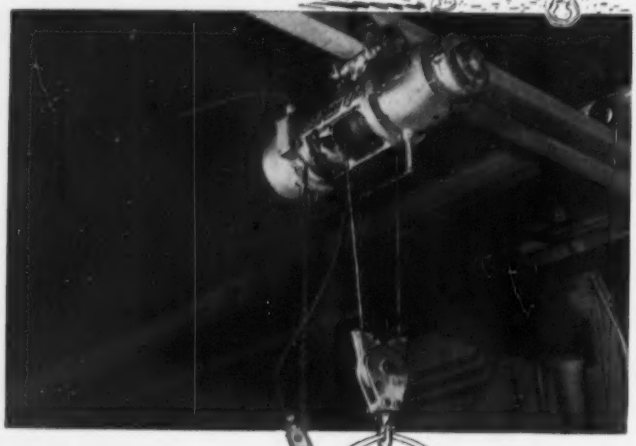

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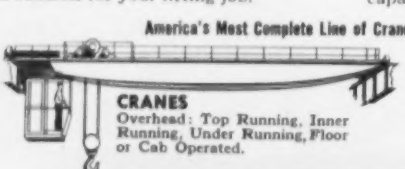

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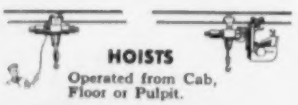

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ducing substances) method as a reliable index of the condition of fish fillets and shrimp, in contrast to the variable significance of either total volatile or the trimethylamine nitrogen for this purpose.

Lingcod, black cod (sablefish), sole, and raw whole shrimp were treated with antibiotics at a final concentration of 2 ppm. or 0.0002%, wrapped in parchment paper and stored at various temperatures above 32 F. Hydroxytetracycline was almost as effective as chlorotetracycline in prolonging the keeping quality of the various fillets. Both were superior to other materials used — *Food Technology*, 503-5, Nov. 1954.

Cuts Potato Shrinkage

Reducing shrinkage of Irish potatoes between time of harvesting and sale without damage to the product is the object of a recently patented process.

In it the potatoes are placed in a closed area, such as a railroad car, and subjected to a gaseous mixture—2 parts ethylene dichloride, 1 part trichloroethane—for approximately 24 hr. Mixture is introduced as a liquid and evaporates to completely blanket the product.

Treatment has been found effective for approximately 10 days. Re-gassing is necessary when longer storage is desired.—US. Patent 2,698,246, Dec. 28, 1954.

Detecting Washed Eggs

Potassium and magnesium salts, chloride and carbonate, are normally present in small amounts on or in the surface of egg shells, and most of them are removed by washing.

It follows, therefore, that tests for these elements and acid radicals can be adapted to identify washed eggs and permit them to be separated from clean, unwashed ones. Most promising method is the chloride test, based on the photochemical reduction of silver chloride on exposure of a test paper to ultraviolet light.

Need for a method lies in the fact that eggs with dirty shells do not keep well in storage, and washing before storage often increases the incidence of bacterial attack. Naturally-clean eggs seldom decay in storage.

Some forms of washing are more objectionable than others and are charged with 20% of the reported bad specimens. Various methods of detection have been devised, but the chloride test bids fair to be the most acceptable for use on a large scale—*Food*, (London) 61-62, Feb. 1955.

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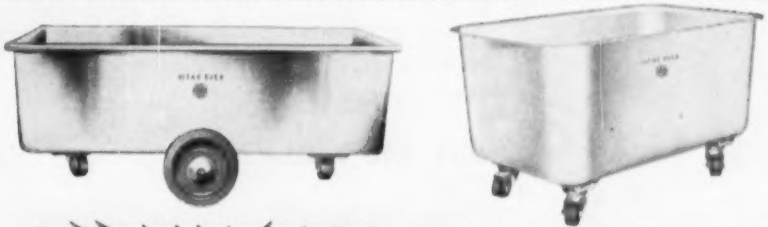

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The Sales Department
THE GREAT WESTERN SUGAR COMPANY
Denver, Colorado

Curbs Product Breakup

—*Continued from page 77*

38 deg. F., the containers retain freshness of the product for 12 days.

Packaging for the delicatessen trade is simplified by filling potato salad into 10-lb.-capacity stainless steel trays. These are rushed to dealers in Cosmo's own trucks.

Preparation of cole slaw at Cosmo, is featured by holding shredded cabbage and carrot mixture overnight in charred wooden barrels. "This imparts a special flavor, missing in all slaw packed into containers directly after shredding", declares Mr. Burstein. For extra eye-appeal, packed cole slaw is given a top-spread of pure mayonnaise before capping.

Other applications seen for this new mixer are in processing of condiments, pie fillings, soup mixes, icings, batters, and emulsions. Unit is made by Falloy Co., Inc., Newark, N. J., and is obtainable with hydraulic lift agitator and bowls mounted on dollies or casters. A standard feature, for increased flexibility, is variable speed control of mixer motors.

End (*Resume reading on page 78*)

Structure of Foods

—*Continued from page 68*

protein for aerating nougats. One is the "V" type for vertical mixers, and the other is the "H" type for horizontal mixers.

Egg albumen is generally used to make a 7-min. type icing powder in conjunction with sugar (6X grind with or without added starch), corn syrup solids for gloss and body, pregelatinized starch (either potato, tapioca, or waxy maize) for body, and carrageenin to keep the aerated mass together and dry—particularly between layers of cake.

New Protein Stabilizer

Research has indicated that the aerated icing most suitable for freezing is one made with a stabilized soy-protein base. This product is unique in that it will not collapse when subjected to baking or freezing temperatures. Such a base is Frip (Food Technology, Inc., Chicago). It is being sold under patent.

Cakes have been given an icing containing the stabilized soy-protein base, and then frozen for 30 days at −25 F. Upon warming to room temperature, the cakes and icings showed no breakdown for 48 hr. (see lead photo).

What about using chocolate?

Push Button Quality Control

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For closer, *automatic* control over cake and pastry sweeteners, Fischer Baking Co. switched their Asbury Park plant to liquid sugar . . . with accurate measurement provided by this Neptune Auto-Stop meter. Every 15 minutes the baker pushes buttons to set the pounds required, and opens the valve. The meter follows through . . . shuts off automatically at the right pound. Big savings are reported in time and labor. No more carting, piling, scaling, and dumping of granulated sugar. It's neater, too, because the sugar stays *inside* pipes and tanks all the way.

Trouble-free operation 20,000 times a year at Fischer's plant is only one of *many* cases where Neptune meters have proved dependability and sustained accuracy in food plants.

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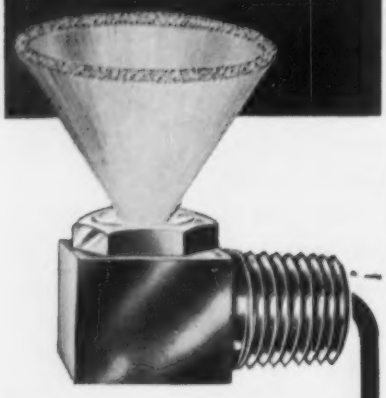

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If temperatures are kept below 86 F. (point at which some cocoa-butter fractions begin to melt), a 12%-fat cocoa will whip with a soy or egg albumen. However, once the temperature exceeds 86 F. (and this happens readily from the friction of high-speed beaters), the free fat increases the surface tension, and the foam breaks.

To avoid release of fat, a 325-mesh de-fatted cocoa may be used, together with burnt sugar for background color. Non-fat cocoa is available either from Europe or from domestic firms that use solvent extraction on nibs to remove theobromine. Since the de-fatted cocoa disperses but does not dissolve, it will give a flecked appearance to the icing unless background color is added.

Analine dyes, if used at higher concentrations, will very quickly break foams through their interference with surface tension. Unless a rich-flavored press cake is used in de-fatting, the resulting fat-free cocoa may lack taste richness.

Once a protein-icing powder has been whipped up, chocolate syrup may be folded in to give a marble-ized appearance without severe collapse of the structure, provided prolonged whipping or folding is avoided.

Going on a step beyond aerated icings, consider a one-package chiffon pie filling. No longer would the housewife have to cook a pudding, beat up a meringue, and then fold the two together. She'd merely pour the dry mix consisting of sugar, whipping agent, milk powder, stabilizer, starch, color, and flavor into hot water, whip, and fill pie shells.

End (Resume reading on page 68)

Fruit Candying

—Continued from page 83

and fruit is then cooled and drained.

Resulting product has a moisture content of 20-25% and up to 120% increase in weight, depending on variety of fruit or peel processed. Due to efficient draining under vacuum, no further drying is required and fruit is ready for packaging, or further treatment such as glace-ing.

Comes in 3 Models

Considerable savings in space and labor are effected with the equipment, which is made by Carle & Montanari, Milan, Italy (U.S. representative, C. A. Mascherin, 220 W. 42nd St., N.Y.C.). Of the three models available, the largest occupies 53½ sq. ft. and stands 15 ft. high. One operator and an assistant can run up to six of the units. Further, the maker reports syrup savings of better than 15%.

The other two models—the DMC/250 and DMC/500—take, respectively, 19¼ and 26¾ sq. ft. Combinations employing smaller units will facilitate processing of several fruit products at the same time.

End (Resume reading on page 84)

FE Award

—Continued from page 62

From the shaker dryer, the product goes through sizing rolls and into drums for storage prior to packaging in cartons.

Research Continues

In the laboratory, technologists are studying the physical and chemical changes that take place in the material during the Peebles process. In addition to the physical changes influencing wettability, solubility, and flavor, other phenomena are suspected. There are indications that the milk minerals migrate to the surface of the particle according to their relative solubilities. This may contribute substantially to the ease with which the milk may be reconstituted.

But even more significantly, current research is underway to apply the process to products such as whole milk, low-sodium milk, chocolate milk, tomato juice, egg solids, and other foods. Success in these efforts could make further important contributions to the food industry's progress in preserving products by moisture removal.

Distinguished Company

In winning the 1955 Food Engineering Award, Western Condensing Co. joins a list of distinguished previous winners:

1953—Geo. A. Hormel & Co., for its process of immobilizing hogs with carbon dioxide.

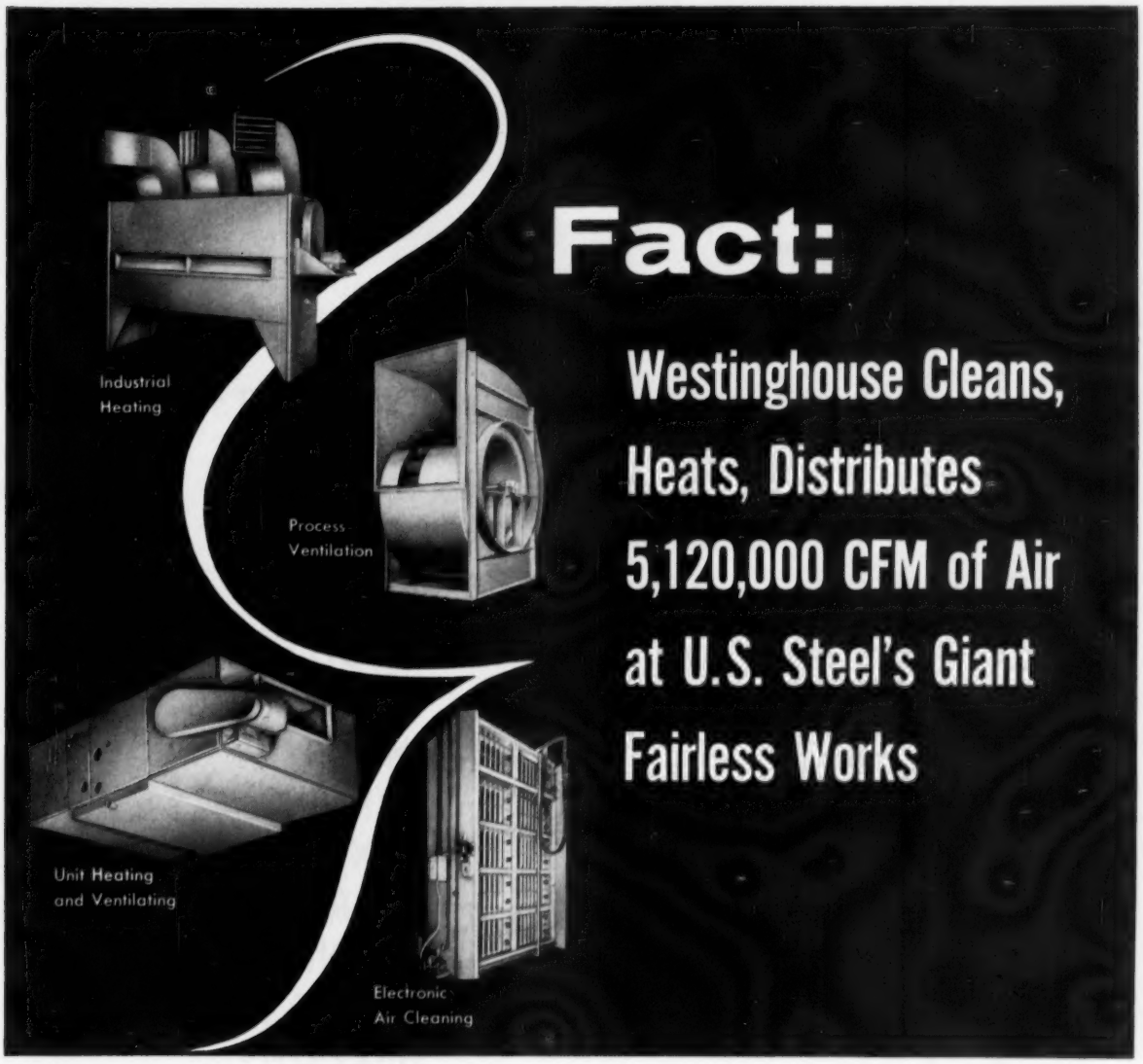
1951—Andersen's Foods, Inc., for aseptically canning pea soup.

1949—Florida Citrus Canners Co-operative, for its frozen concentrated juice process.

1947—Atlantic Coast Fisheries Co., for continuous fish filleting.

The Award Committee

Established to encourage progress in food manufacturing through the development or adoption of advanced processes, the success of the Food Engineering Award is due in large



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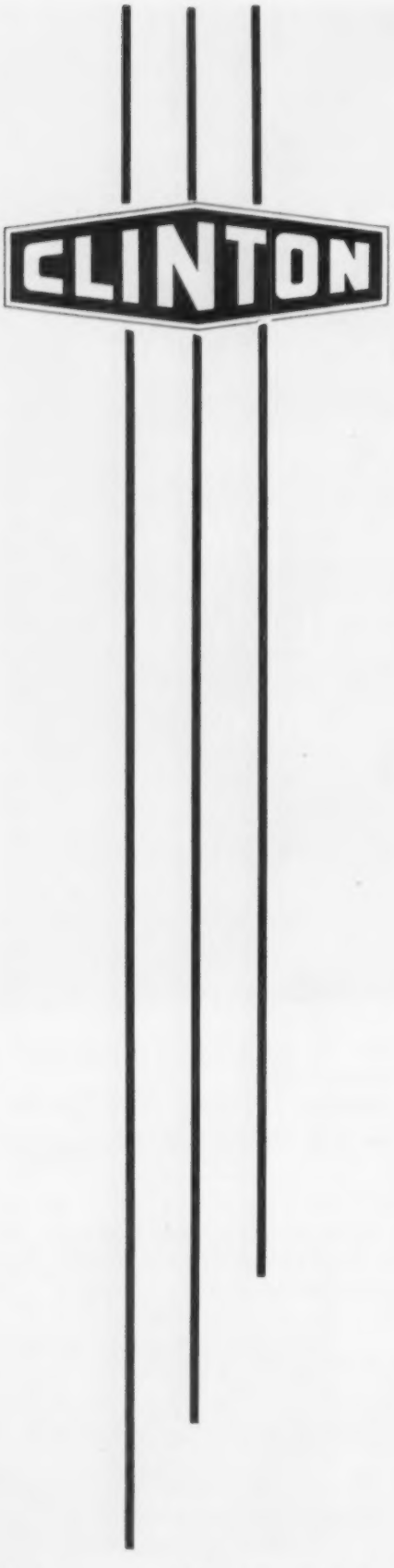

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measure to the unbiased, professional judgment of food technologists on the Award Committee.

These are the 15 members of the 1955 Committee: Samuel C. Prescott, Chairman; R. Adams Dutcher; Carl R. Fellers; W. F. Geddes; David B. Hand; M. E. Highlands; Walter A. Maclinn; Roy Marshall; Reid T. Milner; Emil Mrak; J. Orvin Mundt; Milton E. Parker; Paul F. Sharp; Ernest H. Wiegand; and W. R. Woolrich.

To Those Who Entered

FE wishes to thank those who submitted information on their processes for the Award Committee's consideration. The fact that a particular process did not win does not mean that it is not outstanding. On the contrary, nearly all entries were rated highly by the judges, and some were close runners-up for first place. One of these may well win the next Award.

In any event, everyone who entered the competition contributed to a better appreciation of the achievements of food technology.

FE also thanks the Institute of Food Technologists for the important part it plays in the Food Engineering Award.

The president of the IFT names the Award Committee, and the Award is presented at the annual IFT meeting.

End (Resume reading on page 63)

Macaroni With Gum Gluten

—*Continued from page 74*

Based on the foregoing experiments, a protein level from 12 to 13% would be desirable to promote improvement in the quality of macaroni products.

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Acknowledgment

The author wishes to express his thanks to the Huron Milling Co. for Huron gum gluten used in the experiments, and to Ruth Fierman and Harold Augenbraum of this laboratory, for technical assistance.

End (Resume reading on page 75)

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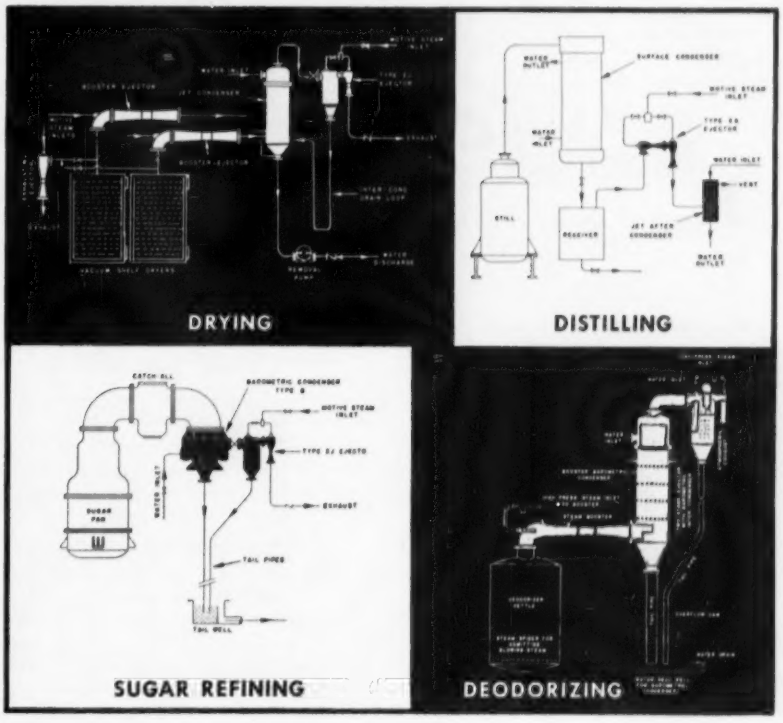

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Questions & Answers

THIS MONTH'S PROBLEM

Trouble With Labels

Question—Is there a foolproof mechanical or electrical device that we can install in our cannery to prevent wrong labels from getting on cans when different products are being simultaneously handled in the same size cans?

MARCH PROBLEM

Re Whipped Butter

The Question—Our firm has been searching the field for a continuous method of manufacturing whipped butter. Could you provide us with complete processing details as well as the necessary equipment?

Answer—A continuous, completely enclosed method has been developed for producing 4,000-6,000 lb. of whipped butter hourly. And, in the whipping stage of the process, sufficient air may be introduced to reduce the density of the whipped product to about one-half of the original butter. Result is an aerated butter with a smoother texture.

Substituted for air in the whipping process is nitrogen or other inert gases for purpose of curbing rancidity and extending the shelf-life of the product.

Operations are carried out in this manner:

Twelve-inch cubes of butter (35-45 deg. F.) are cut into 6-in. cubes—small enough to fit into a conventional-type butter stuffer (C. Doering & Son, Inc.). Stuffer, equipped with a loading trough, comprises a feed roll and twin-screw mechanism for delivering the butter to the suction port of a stainless steel Waukesha pump (see diagram).

Butter is now pumped directly to a continuous mixer (E. T. Oakes Corp.). Air is introduced, under pressure, into butter line between pump and mixing head in exact proportions required for final, desired density of the butter. Speed of the pump, as indicated by a tachometer, determines through-put of butter. Air, on the other hand, is measured in cu. ft. per min. by a flowmeter. In this way, density of the whipped butter is under constant control at all times.

Mixing head of the Oakes unit has a volume less than 3 qt. Butter, therefore, passes through this mixing chamber in a matter of seconds. And, hence, power requirements are correspondingly lower than in batch mixing.

The mixing head comprises the rotor and front and back stators. The two stators are faced together, with the rotor between to form the mixing chamber. Internal faces of both stators and both faces of the rotor have concentric rows of blades. Rotor blades, also in concentric circles, intermesh with those of the stators, and there is sufficient clearance between the blades. —*E. T. Oakes, President, E. T. Oakes Corp., Islip, Long Island, N. Y.*

How Would You Do It?

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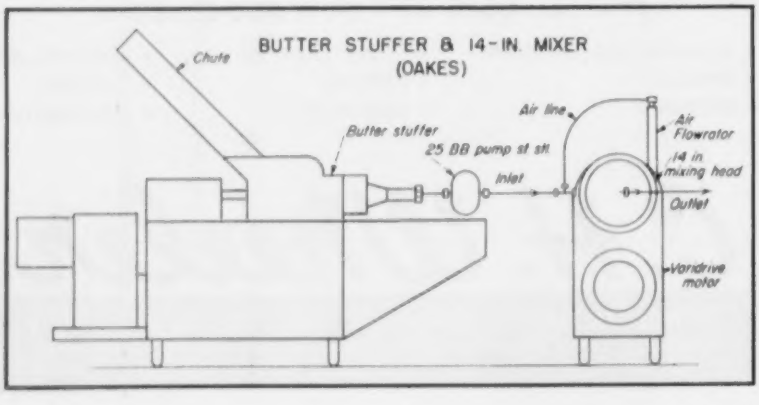


Preparing Almond Paste

Question—How do I go about making an almond paste?

Answer—Bring water to a boil in a steam-jacketed kettle. Now introduce into kettle 60 lb. of blanched, broken almonds. Boil the nuts for about 2 min. until they are moderately soft. Drain water, add 5 lb. of sugar, and run the batch several times through a peanut-butter mill or a double- or triple-roll granite refiner. Grind almonds to a moderately fine particle size, and then add 35 lb. of sugar and 5 lb. of invert sugar.

Charge the batch into a combination mixing-cooking kettle equipped with double agitator. Add 12 lb. of water and slowly mix-cook the batch until it becomes quite plastic (paste will not cling to the back of the hand). Moisture content of batch should run about 14%.

Caution: Avoid using excessive steam pressure during the mix-cook operation to avoid roasting of the nuts. Crack the valve just enough to maintain a pressure of about 30-40 psi.

With the batch now cooked to the proper consistency, turn off the steam and mix 3-4 min. to avoid over-cooked paste films from adhering to surface of kettle. Discharge batch from kettle and onto cooling slabs. When cooled to 80 deg. F., pack into containers and place a sheet of cellophane or waxed paper over the paste and then put the container lid into position.

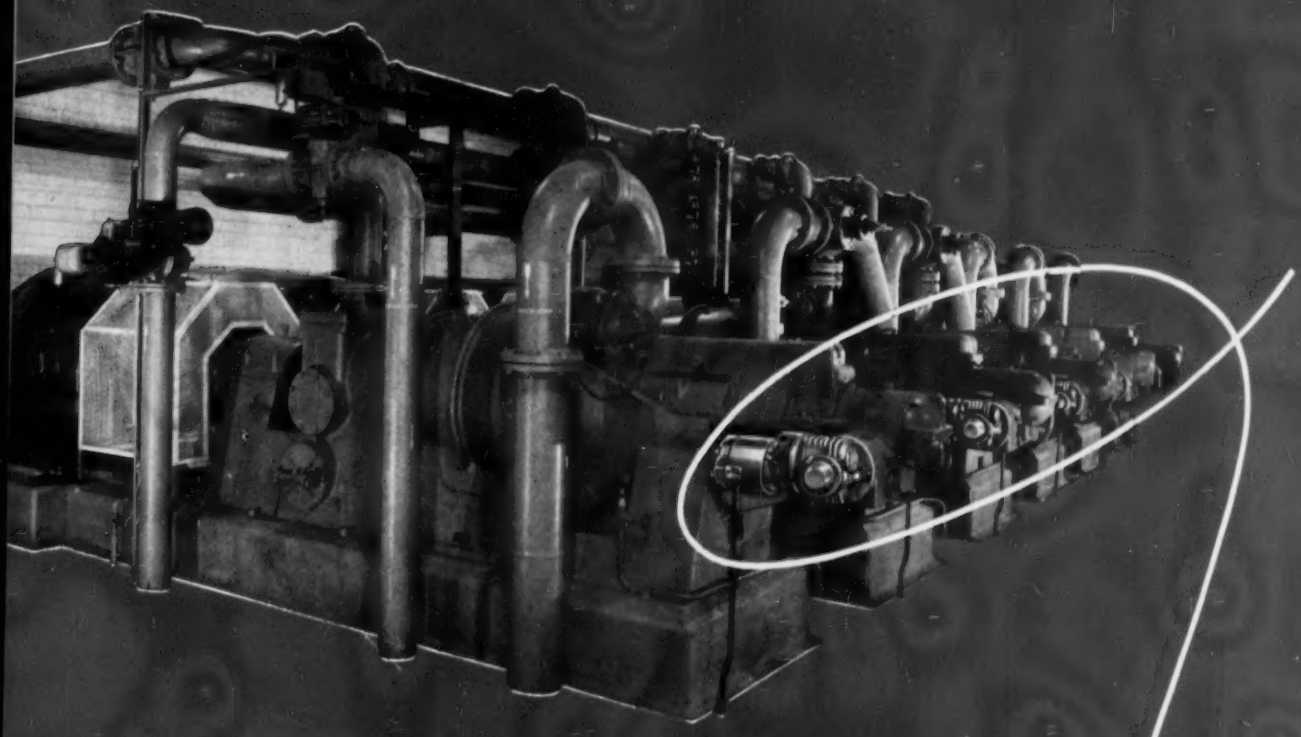
Suggestion: Lightly brush surface of the paste or glaze with a thin film of glycerine or invert sugar at 130 deg. F.

Note: Substitute 5 lb. of blanched bitter almonds to obtain a slightly bitter flavored paste.—*Formula by California Almond Growers Exchange, Sacramento, Calif.*

More On Aerosols

A question appearing in the January, 1955 issue of FE, I believe, requires a little clarification. Question refers to hazards with aerosols. It appeared to me that your answer assumed that aerosols were produced by mechanical- or steam-operated fogging devices. If so, certainly the answer appeared to be realistic and correct.

Perhaps being closely connected with aerosols we cannot see the "forest for the trees", and whenever we see the word "aerosol", we think it applies to us. We are quite anxious, therefore, to dispel any undue fears from hazards of aerosols.



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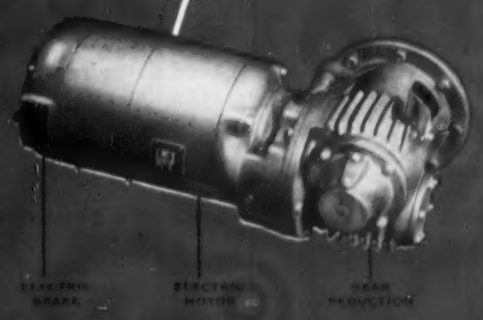

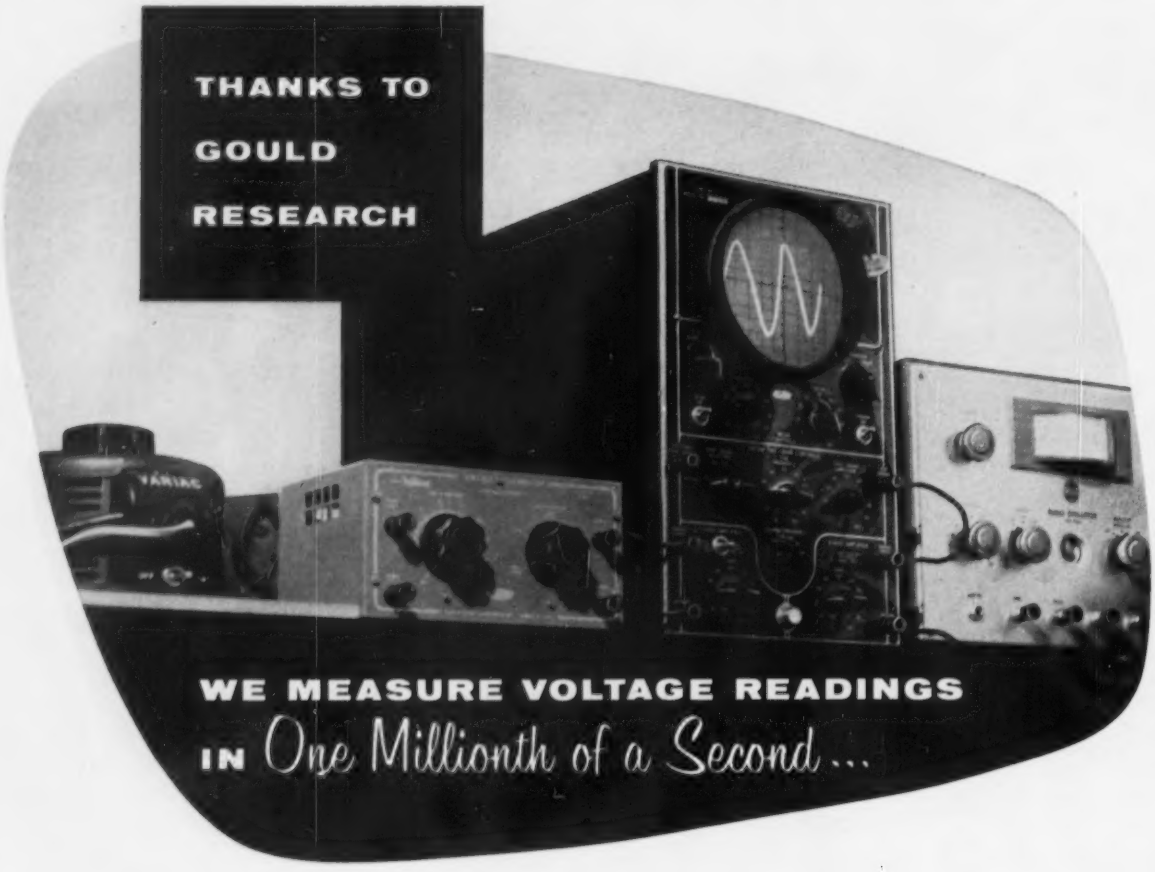

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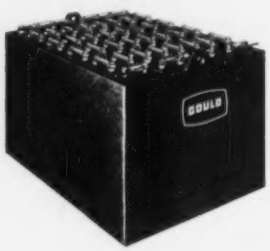

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There are very rigid ICC specifications regarding shipment of flammable compressed gases. Actually, a very high percentage of aerosol products are completely non-flammable and flammable ones are marked as required by law. Those flammable under ordinary use are incapable of creating an explosive mixture, so by and large, it is felt that these products are relatively safe.

Dust Explosion Problem

Question—We strive to minimize combustible dust conditions in our factory. Employed are an efficient dust-collecting system and dust-tight equipment. And there are very few dust-accumulating surfaces. However, we haven't gone so far as to provide, at this time, explosion venting roofs, windows, and hatches. Recently, we've been advised that dry chemical extinguishers—commonly used for fires involving flammable gases, liquids, and electrical equipment—is effective for holding down dusty conditions and checking blazes occurring in dusty locations. Can you advise us of the merits of such extinguishers?

Answer—Dry chemical extinguishers can be very effectively used for inerting dusty atmospheres and for rapid control of fires in dusty areas.

In this regard, it is interesting that engineers of the Ansul Chemical Co., Marinette, Wis., recently conducted extensive fire-protection tests with dry chemical fire equipment to learn more about the fire and explosion hazards from combustible dusts. Here is data from their report:

Most large-particle materials burn at a moderate rate. But finely divided dust particles burn with almost explosive repidity. The finer particles, it has been found, have a much greater surface area in relation to the amount of material in the particle which has to be heated to combustion temperature. When these surfaces are exposed to air and a spark or other source of ignition is present, rapid combustion occurs which very quickly builds up high pressure.

If the dust is not suspended, but is lying dormant, a smoldering fire will often result. However, if the fire-extinguishing agent stirs the particles into a dust cloud, an explosion can result. Thus, large losses have been incurred in mills, with most of the damage due to secondary explosions caused by agitation of dust layers by the first explosion or by extinguishing streams.

Tests further showed that, to reduce damage and yet control these fires, an extinguishing agent must be used which will provide a positive, non-combustible opaque coating on the combustible dust particles apt to be involved in the fire. In addition, the agent must be applied so that dust clouds will not form. Or, in those cases where dust agitation is unavoidable, the extinguishing agent must be able to inert the dust cloud as it is formed.

Dry chemical not only does this but also can be used for inerting dusty room interiors to reduce the explosion hazard. This is done by discharging a dry chemical extinguisher into the room so that the chemical settles over beams, ledges, and other places where the combustible dust may settle.

Factory Mutual Laboratories recently conducted tests for the Ansul Chemical Co., comparing the effectiveness of dry chemical and talc in inerting atmospheres containing cornstarch. The dry chemical was reported to be more effective.

The study indicated that a cloud of cornstarch containing 20% of dry chemical (Ansul Plus-Fifty) would not explode, whereas a concentration of 60% of talc was required to prevent an explosion. Contents of a 20-lb. dry chemical extinguisher would render 4,000 cu. ft. volume inert against the hazard of a dust explosion of the greatest possible concentration of cornstarch in air. On the other hand, 20 lb. of talc would render only 1,300 cu. ft. volume inert.

To determine the effect of using a dry chemical extinguisher in the presence of relatively large amounts of settled combustible dust, Ansul engineers spilled cornstarch over the floor of their fire-test building to a depth of 1 in. After the dust was ignited, a dry chemical extinguisher was discharged into the fire. The burning starch was extinguished and no dust explosion or flashes occurred. Although flammable dust was raised, the cloud of dry chemical was proceeding at the same rate and keeping the combustible dust cloud inerted.

Q.—How should I go about making a lemonade powder?

A.—Mix thoroughly 20 lb. of sugar, 6 lb. of citric acid, and 1 oz. of lemon oil (terpeneless).

Egg Nog Formula

Question—Do you have a formula and method for making egg nog drink of the type sold by dairies?

Answer—Add to pasteurizing vat and heat: Cream (18%), 52.5 lb.; condensed skim milk (30% S.S.), 18.0 lb.; frozen egg yolk (10% sugar), 5.0 lb.; and water, to make up to 10 gal.

Introduce 11.0 lb. of cane sugar when temperature of batch reaches 100 deg. F. Continue heating to 160 F., hold 30 min., and then homogenize (as for ice cream mix) at a pressure of 3,000 psi. Now cool, add nutmeg (powdered) and egg nog flavor to suit, and immediately bottle. Keep agitator in vat running to prevent separation of flavors.

Q.—Is there any simple way to determine the resistance of printed packaging materials to rubbing—especially in the presence of fats and oils?

A.—Rub filter paper saturated with the fat or fatty product over the printed material. Then note any changes in either the filter paper or printed material.

Controlling Package Supplies

Question—Would you please describe a suitable system for accurate control of inventory of such air-conditioned stored printed packaging materials as labels, cartons, etc.? Despite attempts to employ a "first-in, first-out' control system, some carton flaps curl and glue crystallizes on labels. As a result, we've occasionally lost production on our packaging lines.

Answer—You do not detail how your first-in, first-out control system operates. Anyway, we'd suggest that you assign someone (say, the stockman) to the task of policing the use of packaging materials. And make sure you give him the necessary authority.

Next, it might be a good idea to identify incoming supplies by code and receiving numbers.

Q.—We have a rather corrosive product that we'd like to pack in fiber drums. Are there any drums on the market that will resist corrosion?

A.—We'd suggest that you contact your supplier to find out if he has any drums lined with Mylar polyester film. We understand that a moisture-resistant, chemically-inert surface is created by laminating Mylar to the fiber drum.

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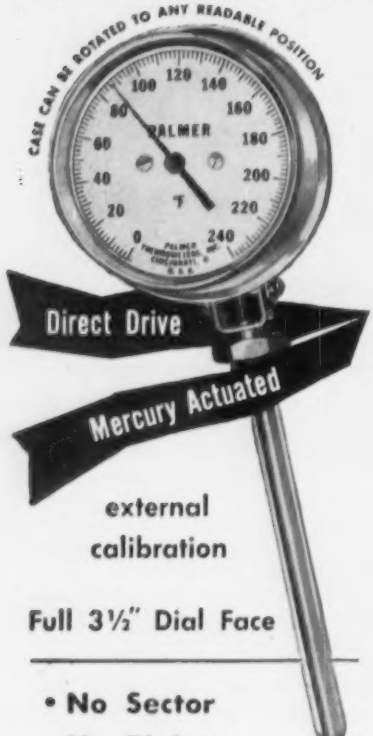

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As for code numbers, you might assign one for each material at the time you set up your specifications. This number would then become a part of all requisitions, purchase orders, stock control, and production records.

To regulate use of these materials, you'd have to request suppliers to code each bundle or case in which they are packed. And, from then on, all persons involved in the use of these materials would have to designate them by code number.

Second step in this system is to have your stockman record the sequence of the receipt of these incoming supplies. To do this, he should make out a card for each material. On each card, separate columns should be provided for what is added and removed from stock. And each shipment should be plainly marked with this number.

These two numbers—code and receiving—must be posted at least daily in the records, otherwise the system will not operate satisfactorily.

Selecting Filling Machines

Question—Can you give us some tips to help us in our selection of a filling machine?

Answer—It is our opinion that the purchase of new filling machines is a three-fold task involving comparing, examining, and then testing the equipment.

First, compare such factors as installation cost, packages handled per minute, labor per case of finished goods, probable overfills (on annual basis), and change-overs (annual basis). Then compare floor space per unit per minute (including work area around machine), accuracy, and change-over time.

Next, arrange to examine the machine, preferably in action. Thus, you will be able to check capacity, change-overs, maintenance, sanitary features, and amount of container damage.

Lastly, test the machine-handling of your product at the manufacturer's plant. And make certain that there are no changes in physical characteristics of the product during shipment from your plant to the equipment maker's shop.

Q.—How'll I make a chicken sandwich spread for canning?

A.—Mix together: Chicken meat, 20 lb.; chicken skins, 20 lb.; gizzards, 4½ lb.; hearts, 4½ lb.; chicken broth, 10 lb.; salt, ¾ lb.; sodium nitrite, 0.15 oz.; onions (fried), 6½ oz.; white pepper (ground), 1.2 oz.; cloves (ground), 0.6 oz.; and mace (ground), 0.6 oz.

Defrosting Eggs

Question—We use considerable quantities of frozen eggs, which are received directly from freezer storage in 30-lb. metal pails. Can you suggest a satisfactory method for defrosting these eggs?

Answer—Your problem is common to a good many food-processing establishments. A number of things have been tried, but probably the most usual method is still to stack the cans in some sort of open or staggered arrangement, and allow them to slowly defrost through the action of normal room-temperature air. Of course, this method offers several disadvantages—space requirements, time needed, mess from condensation on cold surfaces, and bacterial build-up around can walls which naturally warm up fastest.

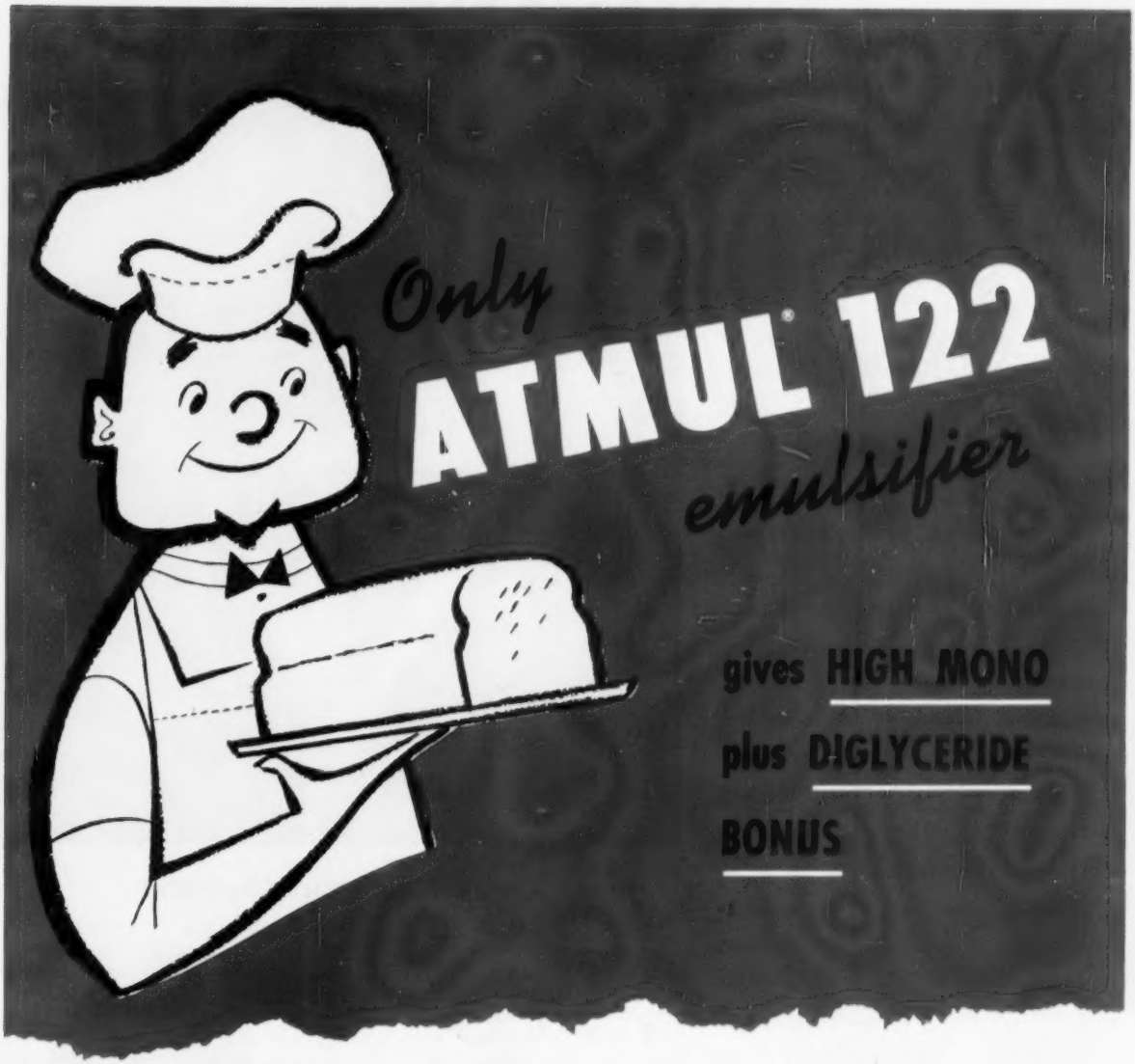
We suggest a tank or vat into which the cans could be immersed in flowing warm water to a depth just below their covers. This method would be particularly attractive if you have clean water available, which is now being used to carry off waste heat, as from a condensor, cooling jacket, or heat-exchanger. In such a case, it would cost you practically nothing to maintain much more rapid and easily controlled defrosting.

A variation on this method might be advisable in the light of your subsequent process—brief immersion (as above) to sufficiently thaw the can contents to permit them to be emptied into a large jacketed agitated vat for final defrosting and simultaneous blending.

It might also be worth while for you to ask yourself whether it is actually necessary in your particular case to *to defrost completely*. What we have in mind is that it might possibly be sufficient to disintegrate or comminute the frozen egg blocks mechanically, as with a hammer mill or riving machine. This would enable you to feed them into your process in desired quantities with little opportunity for any bacterial build-up. It is likely that subsequent operations would then provide sufficient time and heat to defrost small particles and achieve a satisfactory final product.

Q.—How much sorbitol would you suggest adding to candy creams to be coated with chocolate?

A.—Recommended percentage of Sorbo (70% solution of sorbitol) is about 15%. But make certain you cook the batch to a slightly higher temperature to end up with the same texture and moisture content as original centers.



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You'll like its blandness of odor and taste . . . its smooth, white creaminess. And you'll like its economy because less Atmul 122 is needed to give the same softening action!

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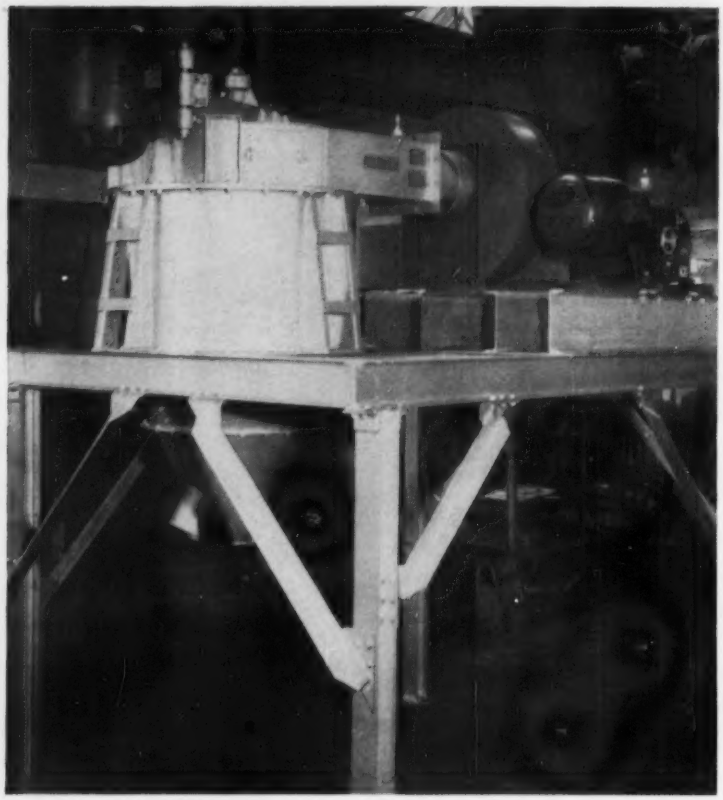
NEW TYPE STURTEVANT AIR SEPARATOR

Recovers Fines in Micron Ranges



Now the famous Sturtevant Whirlwind Air Separator, so widely used throughout industry for fast recovery of fines, has been specially designed to "pick-off" classified materials such as pigments, limestone fillers, plastics, oyster shells, etc., in micron sizes.

These highly efficient air separators select a continuously uniform product of desired fineness. Used in a closed circuit with grinding mills, they increase production, cut power costs.

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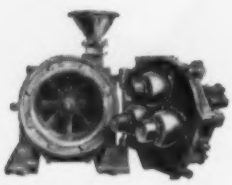
A fluid jet grinding machine, the Sturtevant Micronizer speeds reduction of materials to low micron sizes. These jet mills are especially applicable in fields where a particle size in microns is desired.

Sturtevant Micronizer grinding machines are available in many sizes and capacities.



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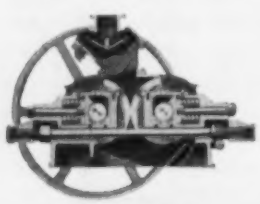

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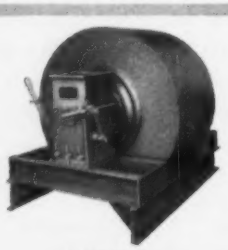

BLENDER
Four-way mixing action assures a thoroughly blended product. Open-door accessibility permits easy cleaning. Available in many mixing capacities for ¼-ton per hour and up.

Units "Handle Handling"

—*Continued from page 91*

storage-building employees. Included in the curriculum are films and lectures on the handling of fork-trucks, pallets and the automatic palletizer.

These have been followed by on-the-job instructions in loading from the machine and handling the fort-trucks through lanes of stored cartons and other obstacles.

Operators of the fork-trucks are equipped with safety facilities such as steel shoes, to guard against accidents.

Engineers at O'Keefe's say it's too early yet to assess the full economies of the automatic distribution system. But theoretically the new palletizer makes it possible to accomplish, with only a single operator, the work formerly done by six men stacking manually.

End *(Resume reading on page 92)*

Corn Syrup

—*Continued from page 76*

improved flavor, color and texture just as preserves do. Here again, the reduction of total sweetness resulting from the use of corn syrup enhances natural flavors. This is particularly beneficial with delicately flavored fruits.

One of the problems that has always plagued catsup packers is the maintenance of color. Deterioration usually begins in the neck of the bottle, developing more slowly in the body of the catsup. It is thus believed due to oxidation. Recent research shows that using corn syrup for at least a portion of the sweetening ingredient substantially retards the rate of color deterioration, particularly in the neck of the bottle.

Packers of frozen fruits in ready-to-eat consumer-sized packages have found that the use of corn syrup improves the over-all quality of their products. Chief among the reported advantages are reduction of fruit dehydration, improved color, sheen, and texture, and better flavor.

Before freezing begins, the sweetening medium must completely coat the surface of the fruit to protect it against oxidation, shrinkage, and fermentation. Syrups effect a quick coating and a rapid exchange of the sweetening medium with the natural fruit juices. Density of the syrup sweetener is important in retaining the firmness of fruits, the interchange of heavier syrups for the lighter solutions within the fruits postponing the natural collapse of frozen fruit tissue upon defrosting. Corn syrups appear

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The natural standard color for dry food products ranging in shade from light to dark brown. Recommended for use in—

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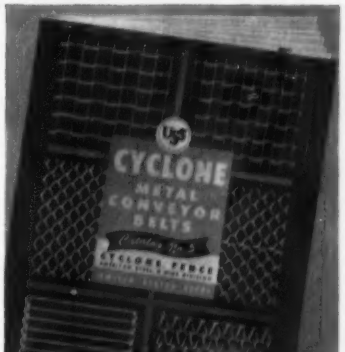

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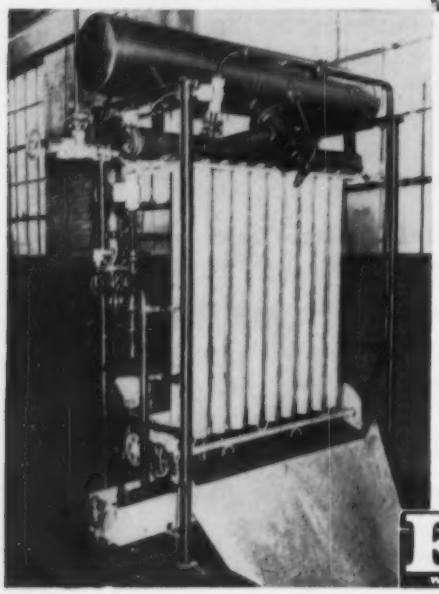

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to facilitate this interchange, thus helping to maintain the plumpness of the fruit as well as the natural flavor and color.

Processors of dry-packed frozen fruits for institutional and industrial users have found that corn solids give them a superior product too. Capping bulk packs with a layer of this product protects the fruit from oxidation, and gives a superior colored and textured product upon thawing. Preserves, ice cream, pie and the like made from frozen fruit packed in this manner also show superior color, flavor, and texture.

Other Products Benefit, Too

Many bakers of high-quality cakes use corn syrup as a dough or batter conditioner, to improve moisture retention. Cakes made with it thus retain their freshness for a longer period. Icings and pie fillings made with it also have improved properties.

Other items benefitting in various ways from the use of corn syrup include condensed milk, baby foods, sweet pickles, salad dressings, spray-dried juices, sausages and other meat food products.

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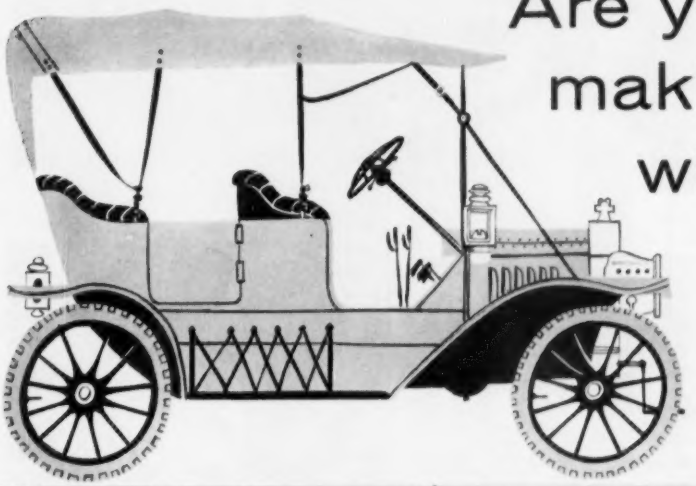
End (Resume reading on page 77)

More Labor Tips

—Continued from page 114

ment has considerably improved Consolidated Edison's salvage rate—from about 45% to more than 70%.

"Now," according to Dr. Franco, "we may consider prevention of problem drinking through employee education. However, at the present level of experience, we can't see any preventive shortcuts. We don't feel that



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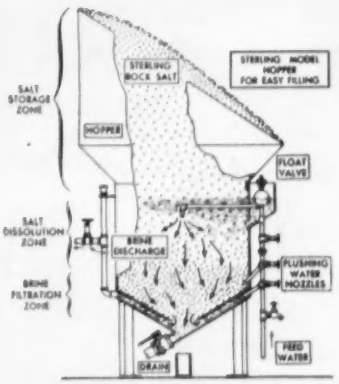

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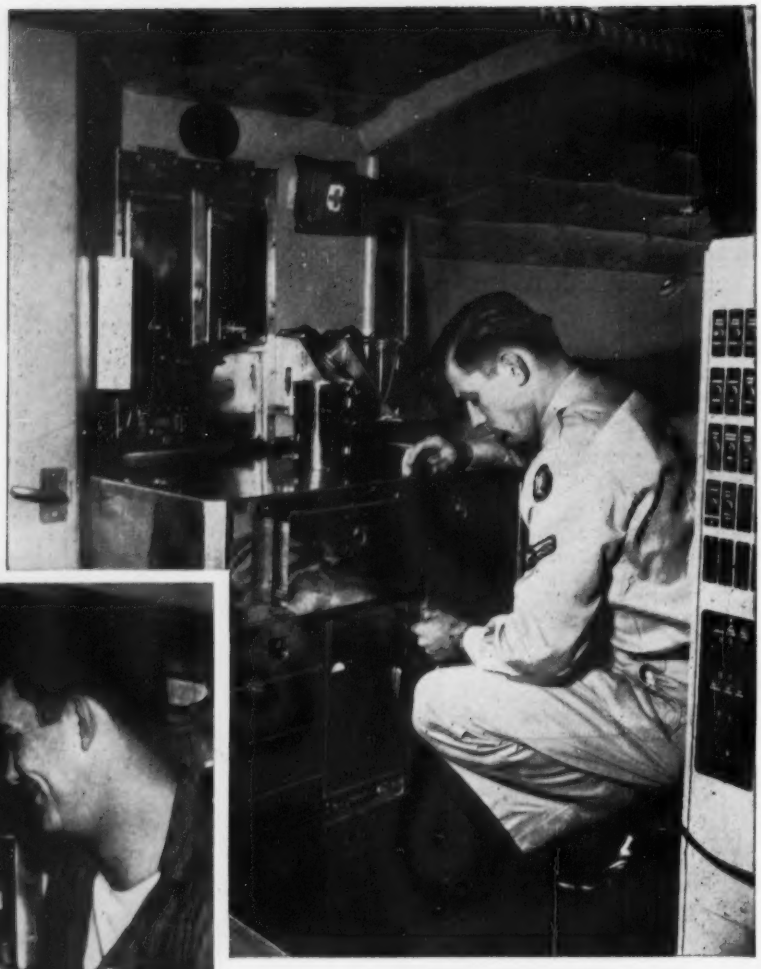

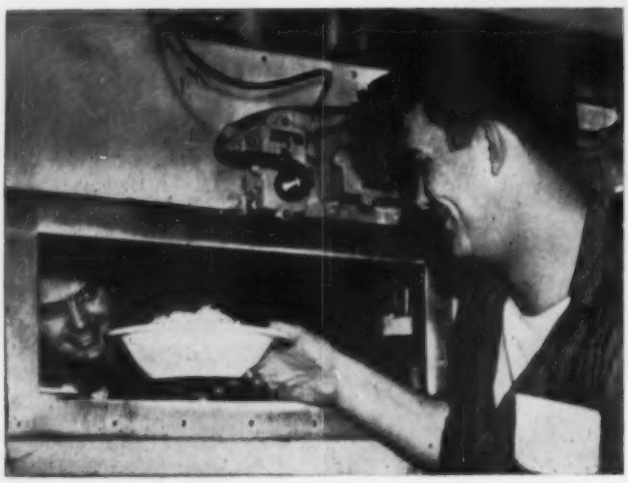

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psychological testing or job reassignment will act as preventive measures. There is need for continued research.

But results of company programs have been "more than encouraging" Dr. Franco concluded, "and there is a growing realization that industry can, through such plans, make very worthwhile efforts in helping the problem drinker."

Pastoral Aid for Employees

"On-the-job religion, applied by psychologically sound counseling methods, may be an answer to industry's neglect of its workers' spiritual side," suggested the Rev. Clifford H. Peace, pastor-counselor, R. J. Reynolds Tobacco Co.

Rev. Peace continued: "In recent years, industrialists have tried to outdo each other in heaping material benefits on employees, but there has been appalling evidence of suspicion, distrust, and ill-will in industrial relations. Man must be understood and dealt with as a whole, and that is never accomplished when his spiritual side is neglected." Another reason for pastorates, according to Rev. Peace, is the extent of emotional illness.

"It is currently estimated," he said, "that one-third of our people are ill. There are approximately four million people in America who are in some stage of alcoholism, with approximately 1,650,000 of them in industry. From 80 to 90% of all accidents spring from emotional rather than physical causes."

In 1949, R. J. Reynolds began making on-the-job pastoral care available to those desiring it. This includes visits to the people in homes and hospitals, and relationships are confidential.

It is not, stressed Rev. Peace, something which the front office buys for the laboring man. It is not a substitute for good labor-management practices, although it can affect the attitudes behind the policies. It is not synonymous with arbitration in labor-management disagreements, nor is it an out-of-channels over-the-heads-of-supervisors handling of personnel problems, though it can help both the personnel and the personnel officers to get at the causations of unhappiness. Neither is it a coddling of soreheads in industry, although it can be a cure for them.

The pastoral counseling, he said, offers emphatic listening instead of preaching sermons. It does not judge conduct. Rather, it helps to release feelings, as only religion can.

"Within the past five years," he retorted, "1,465 persons at R. J. Reynolds have taken part in a total of 3,090 counseling sessions.

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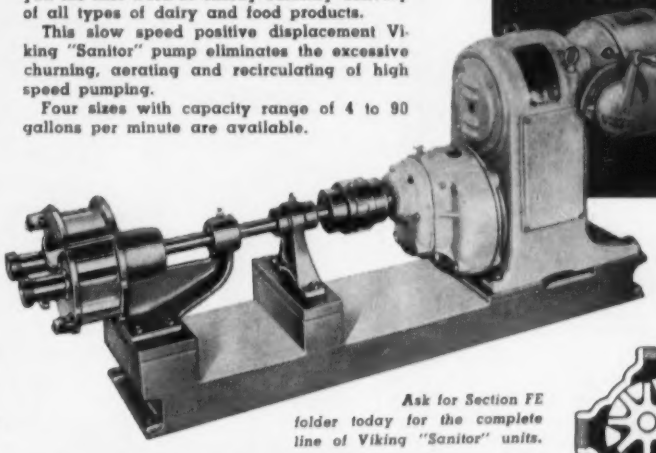

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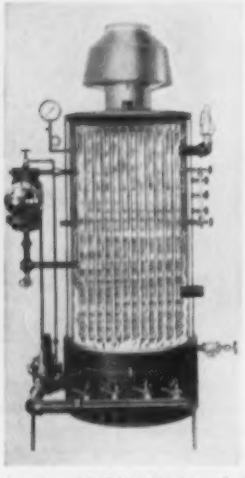
Our helpful, new Boiler Feed Bulletin, No. 4G, will gladly be sent upon request.



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End (Resume reading on page 116)

Stabilizing Tea Extract

—*Continued from page 85*

tion would reduce shipping and packaging costs and offer a small, attractive package competitive with the powdered product. Only about ½ teaspoon of a 25% tea solubles concentrate would be needed to prepare a 10 or 12 oz. glass of iced tea. Stabilization of clarity would be accomplished similarly, with use of larger quantities of agents.

Economical commercial preparation of a tea concentrate is largely dependent on the following factors: (1) Minimizing required tea leaves per unit of product; (2) using smallest possible quantity of glycerine; and (3) cutting container costs.

Involved in the process are these steps: (1) Hot water extraction of tea leaves; (2) addition and dissolving stabilizers in hot tea; (3) packaging; and (4) sterilization.

It is obvious that the tea leaf cost is determined by the efficiency of extraction. For this reason a highly effective multi-stage, counter-current, displacement-type system is recommended. This involves first swelling the leaves in a portion of the final concentrate, followed by their introduction into the last stage of the extraction system. Here, they are contacted by the rich concentrate just before it is discharged from the system.

Final concentration can be as high as desired (up to, perhaps the 25-30% range) by proper design of the extraction system. Since it is closed and does not necessitate additional evaporation to achieve high concentration, flavor and aroma retention is very good.

References

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4. Kappenberg, W., U. S. Patent 2,204,-896, June 18, 1940.
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End (Resume reading on page 86)

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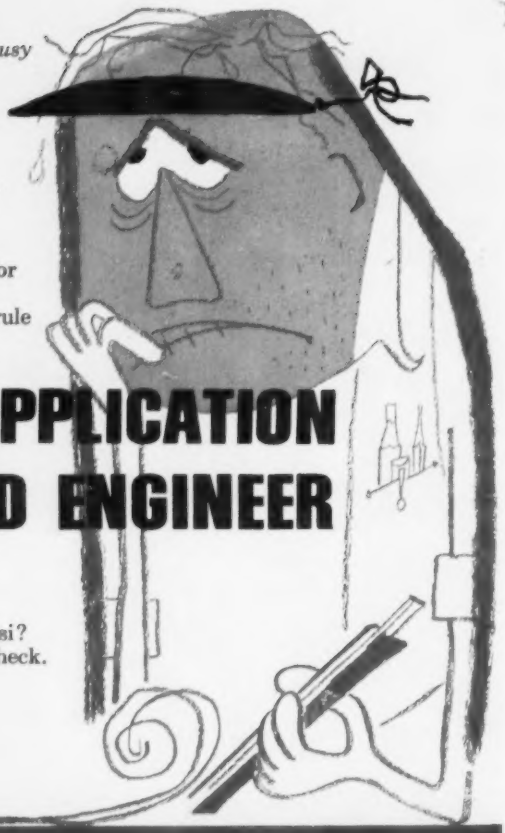
Herman decided a jet was ideal for the job. Herman was right!
He took pencil, paper, and slide rule in hand and settled down to



THE CASE OF THE JET APPLICATION AND THE OVERWORKED ENGINEER

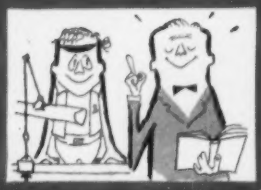
work out the problem . . .

Syphon? Eductor? Exhauster, compressor, jet vacuum pump? psi? gpm? Derivation, computation, check.

Herman was wrong! And, he knew it—knew there had to be an easier and better way.
So this is what he did . . .

Sent to Schutte and Koerting Company for a copy of new Bulletin J-1 on "Jet Apparatus and Its Industrial Applications." Found out what he needed to know about the characteristics, varieties, and ranges of Jet Apparatus.

Labored out the function required and the types of jets suitable for such a function. Identified the type most suitable for his particular requirements.



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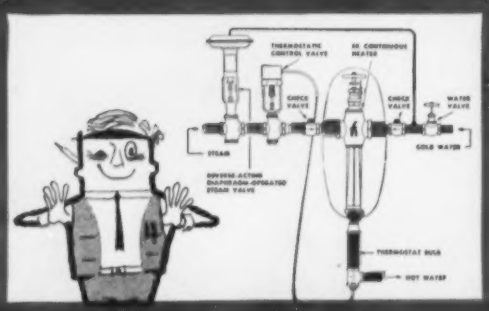
The SK Fig. 320 Steam Jet Continuous Heater shown at right mixes steam with cold water to provide hot water. A thermostatic control valve limits the amount of steam admitted and thus controls the temperature of the hot water. A reverse-acting, diaphragm-operated steam valve prevents steam from discharging before the water valve opens or after it closes.



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Useful New Books & Government Publications

"Food All Over"

THE STORY OF F.A.O. *By Gove Hambidge. Published by D. Van Nostrand Company, Inc., 250 Fourth Avenue, New York 3. 1955. 303 pages. 6 x 9¼ inches, cloth. Price* $6.50.

Much of the food technology and agriculture of today's world is still at the primitive level. Gigantic strides have been taken in this country in mechanization of agriculture and in improvement of food processing. Comparable advances in the next few decades are certain to follow in other countries around the world. F.A.O. is doing all that it can to encourage such advances. What is our industry doing to help?

This book deserves to be a well-read volume. A copy should be within the reach of every food technologist and every food executive. Whether we wish or not, international food trends will determine our own future. We should know more about them, both for selfish reasons and to enable us to support the better trends.

Aiding the Engineer

NOMOGRAPHY AND EMPIRICAL EQUATIONS *By Dale S. Davis. Published by Reinhold Publishing Corp., 430 Park Ave., New York City 22. 1955. 236 pages. 6¼ x 9¼ in., cloth. Price:* $6.75.

A full and comprehensive explanation of how nomographs and empirical equations may be used to make the work of the engineer easier and faster.

Part One deals with the development of empirical equations for two- and three-variable data. The second section covers theory and construction of industrially important types of alignment and line coordinate charts.

Preparation of Food

INTRODUCTORY FOODS. *By Osee Hughes. Published by Macmillan Co., 630 Fifth Ave., New York City 11. 1955. 551 pages. 5¾ x 8½ in., cloth. Price:* $4.75.

Designed primarily as a text for college food study, the book is of value to the food processor. It offers a clear and up-to-date picture of the principles of food processing and preparation, with particular emphasis on nutritional content and nomenclature.

A third edition of a popular text, it includes chapters on fruits and vegetables preparation, frosted foods, beverages, fats and oils, gelatin, freezing, batters and doughs, and food preservation.

The sections on cake baking, for example, includes data on preparation of baking pans, baking temperatures, characteristics of good cakes, formulas, and photographs. Other sections are equally detailed.

Indexed and illustrated, the book is of interest to the food processor or technologist who desires a simple but accurate desk reference.

Small Plant Relations

HUMAN RELATIONS IN SMALL INDUSTRY. *By John Perry. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 36. 1954. 313 pages. 6¼ x 9¼ in., cloth. Price:* $6.50.

Labor relations, company group feeling, and many other facets of good human relations in industry are discussed by the author in this comprehensive book, with a specific eye out for the problems of the small plant or business owner.

Why the problem is more widespread in small industry and what should be done about it are only a few of the questions answered by the author, a human relations consultant with years of experience in this wide field.

Hundreds of specific examples based on industrial experience, supplement the text.

Four New Editions

MANUAL OF EXCELLENT MANAGEMENTS, 1955. *Published by American Institute of Management, New York City. Price:* $20.00. Second annual survey of companies certified as "excellently managed" and listing of AIM awards.

SOY BEAN BLUE BOOK, 1955. *Published by American Soybean Assn., Hudson, Iowa. Price:* $3.00. Latest data on soybean crop and industry.

HEATING, VENTILATING, AIR CONDITIONING GUIDE, 1955. *Published by American Society of Heating and Air-Conditioning Engineers, New York City. Price:* $12.00. Enlarged and revised reference for those concerned with heating or air-conditioning.

1955 DIRECTORY OF PUBLIC REFRIGERATED WAREHOUSES. *Published by National Assn. of Refrigerated Warehouses, Washington, D. C. Price:* $10. *(no charge to companies using refrigerated warehouses for storage of perishables).* Guide to local, national, and international public warehouse space.

(Turn Page)

FE REPRINTS AVAILABLE

Listed below are special sections, flowsheet book, and articles from past issues of FOOD ENGINEERING which are available in reprint form. Single-copy prices are listed. For orders of 2 or more, there is a 25% discount. You order the reprints by circling the corresponding numbers on the Reader Service Coupon, inside the back cover. You will be billed when your order is filled.

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Contains a series of 9 articles: (1) Cold Sterilization Problems. (2) New Continuous Lard Process. (3) Progress in Meat Dehydration. (4) High-Speed Chub Packaging. (5) Atomic Irradiator Designed. (6) Improvements in Unit Tasks. (7) New Processes for Old Products. (8) Map Unravels Delivery Snags. (9) Saves 50% of Retort Steam.

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Ten timely articles are included: (1) Dairymen Face Challenging Changes. (2) New Processes for Instant Dry Milk. (3) Controls Presage Automatic Dairy. (4) Save With Cleaned-in-Place Pipes. (5) Bi-Oxidation Solves Waste Problem. (6) Cheese Keeps in Antimycotic Wrap. (7) Plastic Tank for Milk Trailers. (9) Bulk Handling Aids Processors, Too. (9) Advanced Dry Milk Flowsheet. (10) "Tracers" Detect Foreign Fats.

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6. Book of Flowsheets.....$2.00

Few copies of 1949 edition still available. It contains 130 process charts covering a wide variety of food manufacturing operations. Charts are accompanied by brief descriptions of the processes.

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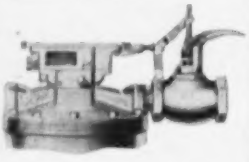

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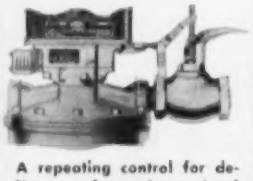

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Catalytic Processing

CATALYSIS. *Vol. II. Edited by Paul H. Emmett. Published by Reinhold Publishing Corp., 430 Park Ave., New York 22. 1955. 473 pages. 6½ x 9¼ in., cloth. Price:* $12.00.

Second in a series designed to provide research chemists with a reference work on the physical chemistry of catalysis and catalytic processing. The first volume dealt with catalytic supporters, carriers, and methods of preparation.

This latest book, a continuation of the discussion of fundamental theory, and classifies catalysts according to current ideas of solid state physics.

The book is indexed and supplemented with charts and graphs.

Research in Food

EXPERIMENTAL COOKERY *Fourth Edition By Belle Lowe. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York City 16. 1955. 573 pages. 6¼ x 9¼ in., cloth. Price:* $7.50.

In this thorough and careful rewrite of an earlier edition, the author attempts to bring the readers up-to-date on recent research in the field of experimental cookery. Approaching the subject from the chemical and physical bases, she presents a valuable reference work for those concerned with food research or preparation.

A new chapter on acceptability has been added, with interesting treatment of sensory methods for determining differences in foods.

Booklets and Reports

MANAGEMENT PLANNING AND MANPOWER DEVELOPMENT (*No. 173 in General Management Series*). *Published by American Management Assn., New York. 44 pages, paper. Price:* $1.25. Over-all company operations, long-range planning, managing men and equipment, marketing, management objectives, and staff functions.

PRACTICAL TECHNIQUES OF FORECASTING, PLANNING, AND CONTROL (*No. 216 in Manufacturing Series*). *Published by American Management Assn., New York City. 60 pages, paper. Price:* $1.25. Methods in use at two major companies.

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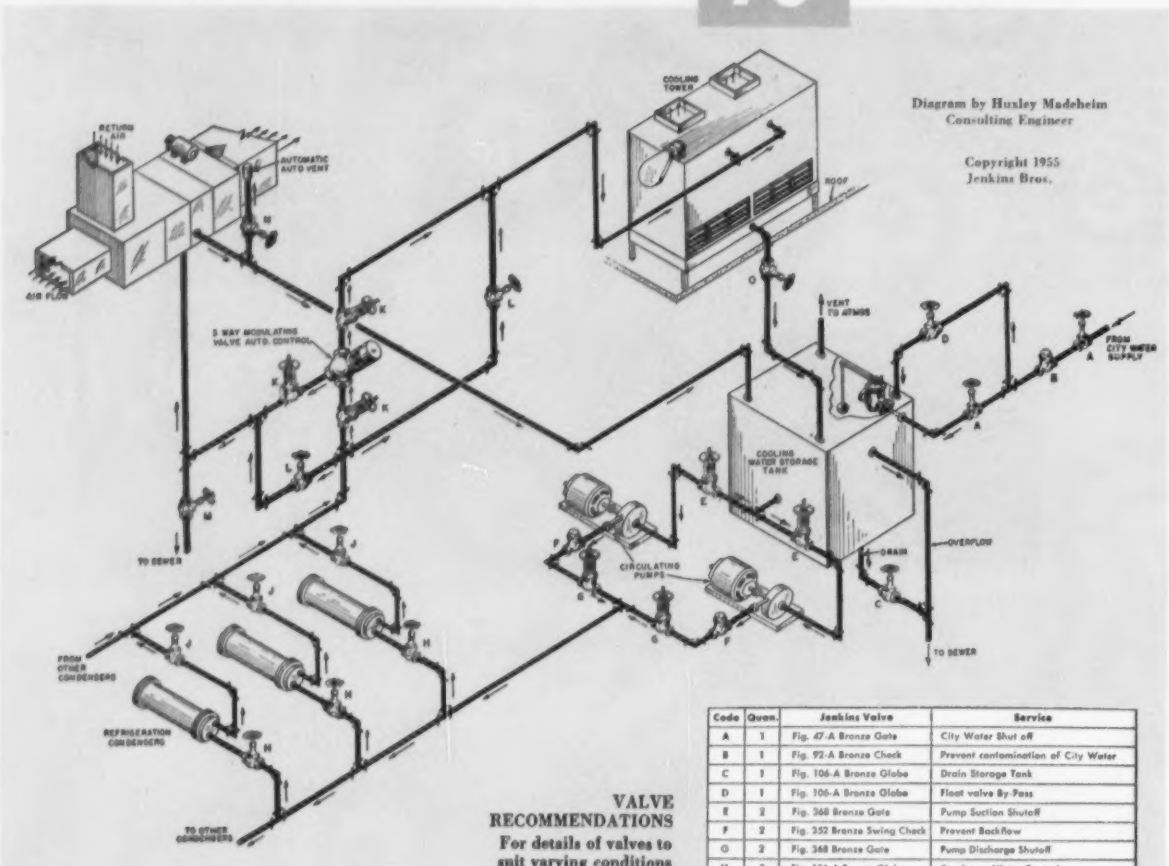

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Consulting Engineer

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B	1	Fig. 92-A Bronze Check	Prevent contamination of City Water
C	1	Fig. 106-A Bronze Globe	Drain Storage Tank
D	1	Fig. 106-A Bronze Globe	Float valve By-Pass
E	2	Fig. 368 Bronze Gate	Pump Suction Shutoff
F	2	Fig. 352 Bronze Swing Check	Prevent Backflow
G	2	Fig. 368 Bronze Gate	Pump Discharge Shutoff
H	3	Fig. 106-A Bronze Globe	Condenser Water Control
J	3	Fig. 370 Bronze Gate	Condenser Water Shutoff
K	3	Fig. 368 Bronze Gate	Modulating Valve Shutoff
L	2	Fig. 106-A Bronze Globe	Modulating Valve Bypass
M	1	Fig. 106-A Bronze Globe	Drain Heating Coil
N	1	Fig. 106-A Bronze Globe	Vent Control
O	1	Fig. 106-A Bronze Globe	Cooling Tower Water Discharge Shutoff

How to plan piping connections for

SPACE HEATING WITH HOT WATER DISCHARGE FROM REFRIGERATION CONDENSERS

Where continuous refrigeration is required, the heat absorbed by the water circulating through the condensers during the refrigeration cycle may be transferred to circulating air and used for space heating. This hookup illustrates a system that is widely approved for utilizing waste heat in frozen food plants, ice cream plants, supermarkets, and refrigerated warehouses.

A cooling tower for water conservation is included in the usual water cooling system for refrigeration condensers, as indicated. All or a portion of the water which usually flows through the cooling tower system may be diverted and circulated instead through a water coil in the summer air conditioning unit. A three way modulating valve, actuated by a room thermostat, controls the water passing through the two parallel circuits, dividing it according to the heating requirements.

Excess heat, when all the heat is not required, is removed by regulating the amount of the water circulated through the parallel path of the cooling tower. Additional heat may be provided, when needed, from any other customary source.

The cooling tower circuit provides for water storage in a tank inside the building to avoid freeze-ups. The water circuits shown can be full weight red brass pipe, copper tubing, or black iron pipe.

This combination of refrigeration and heating is an adaption of the heat pump cycle and will provide both refrigeration and heat for minimum operating costs.

Consultation with accredited piping engineers and contractors is recommended when planning any major piping installation.

To save time, to simplify planning, to get all the advantages of Jenkins specialized valve engineering experience, select all the valves you need from the complete Jenkins line. It's your best assurance of *lowest cost in the long run.* Jenkins Bros., 100 Park Ave., New York 17.

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KEEPING UP WITH THE FIELD

Technical News • Washington Highlights • Economic Trends • Labor Developments

New Hope for Nickel Bar

With wholesale cocoa bean prices now down more than 40% from the record-high 1954 quotations, manufacturers have new hope of holding price and size of candy bars at the present level.

Blight-reductions of crops in 1953 started the upward spiral in cocoa prices that resulted in increased use of chocolate substitutes and a strong tendency to curtail the nickel bars.

Consumer and manufacturer resistance, better synthetic substitutes, and greater 1955 crop expectations are given as reasons for recent import price declines.

2 Juices Need No Freezer

Superconcentrated 7-fold apple and grape juices, new products now headed for the market, have been stored for an entire year without freezing or refrigeration.

Developed by USDA's Eastern Utilization Research Branch, Philadelphia, the juices were reconstituted after a year's storage at 73 deg. F. with only a slight change in flavor.

Storage has been satisfactorily maintained in both glass and tin containers. The process features ultra-rapid flavor-essence recovery and fast cooling after a 180-deg.-F. hot pack.

Promising Caviar Source

Several million pounds of Alaskan salmon eggs, formerly wasted, can now be utilized for making a smoked salmon cavair spread, newly developed by the Fish & Wildlife Service.

Previously frozen chum eggs are thawed and brine-soaked. Drained product is smoked, ground, and seasoned to produce a bright orange paste without the rubbery texture that has plagued manufacturers.

After processing, bacterial spoilage is no problem. And antioxidants are being tried, with apparent success, to curb fishy off-flavors.

Beet-Sugar "Piloting"

Advanced techniques in sugar-beet processing will be investigated in a new $45,000 pilot plant now nearing completion at Western Regional Research Laboratory, Albany, Calif.

Sponsor of the new facility is the Beet Sugar Development Foundation, Fort Collins, Colo.

With chemical nature, molecular weight, and other properties of major beet components now known, process research with the new equipment is seen speeding the current strides in beet-operation efficiency.

New Vegetable-Chip Items

Flavorsome chip items, on the order of potato chips, have now been developed from various vegetables by Eastern Utilization Research Branch, USDA, Philadelphia.

Made, in the tests, from carrots, beets, peas, lima beans, and parsnips, these products may be given varying appeal with addition of salt, garlic, or other spices.

The vegetables can be processed into chips, or can be ground into basic soup powders for water reconstitution. Addition of a smoked-yeast protein to peas yields a tasty soup.

Recommended is a modified coconut oil for deep fat frying of the chips. However, peanut, corn, and cottonseed oils may also be used.

Products have been kept as long as a year at room temperature when fried in a highly stable oil. Carrots have proved the least stable.

No commercial processors have yet undertaken production of the chips.

4-Part Nutrition Concept

Coordinated action by the food industry is now proposed in order to simplify the working concept of good nutrition.

Suggested by The Nutrition Foundation, a new four-part classification was recently endorsed by Paul S. Willis, president, Grocery Manufacturers of America, speaking at the National Dairy Council's recent winter conference in Chicago. This grouping includes:

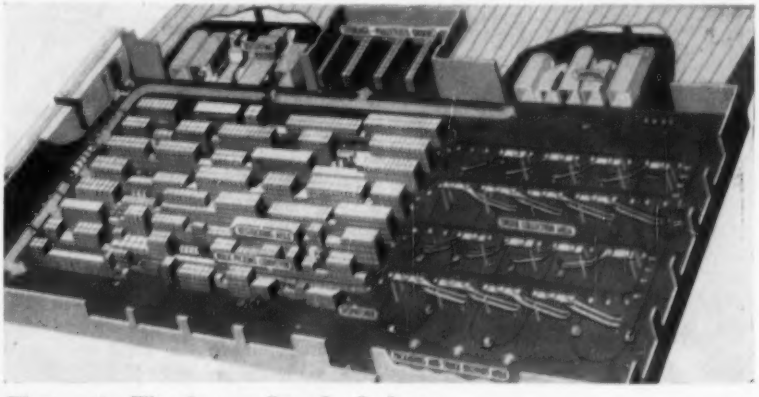
1. Animal protein foods—meat, milk, eggs, cheese, and fish (with emphasis on extra milk for growing children)—to furnish amino acids, vitamins, and minerals.

2. Green leafy and yellow vegetables—broccoli, green peas, green beans, asparagus, and carrots—to provide minerals, plus vitamins and fiber.

3. Citrus fruits and juices—along with tomatoes, melons, bananas, and berries—to give vitamin C, plus other vitamins and minerals.

4. Cereals, fats, and sugars—for specific nutrients (vitamins and minerals) and low-cost energy required to maintain proper body weight.

The new concept may be regarded as a compromise between the "Seven Basic Foods" promotion (originated during World War II) and the extreme simplification to only two groups—"energy" foods and "protective" foods.



Electronic Warehouse Speeds Orders

Savings in labor (50%) and space (25%) are seen effected with this new-type warehouse. In a layout where storage and picking aisles are alternated, warehousemen read punch-cards to select items from gravity-supply chutes, then load the goods on conveyor trays. These trays, with cards, pass along to a dispatcher, who utilizes cards to activate electronic trip-devices that dump orders into accumulating chutes. Then chain-pulled carts move full shipments to outgoing dock. Prototype installation has been set up for demonstration at Colmar, Pa., plant of Link-Belt Co., which teamed with Walter Kidde Constructors, Inc., N.Y.C., in its design.

Special Ray Units to Treat Grains, Tubers

Atomic radiation of grains and potatoes to eliminate insect pests and prevent sprouting now holds promise for immediate application in the food industry.

Preliminary plans for mobile, semi-mobile, and fixed Cobalt-60 units for control of grain pests were recently outlined by William E. Chamberlain, assistant director, Atomic Energy Dept., American Machine & Foundry Co.

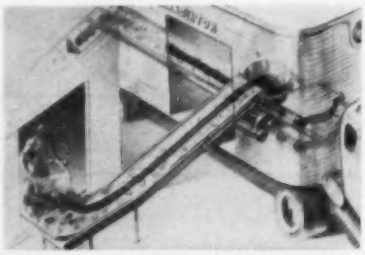
Convenient Installation

Such irradiators may be installed in R.R. cars or elevators for treatment of grains on arrival at storage areas. In addition, these units will house dehumidifier-separators for drying grain and segregating foreign materials.

Mobile truck-contained AMF units are further planned for potato irradiation in the field, or at warehouse points (see photo).

This technique of preservation, utilizing relatively small amounts of radiation, has been shown to greatly extend storage life of these products, said Mr. Chamberlain. And the process has no adverse effect here on flavor or quality.

The gamma radiation source, Cobalt 60, meets requirements of a good control system—it is effective, low in cost, and has great flexibility of operation.



TRUCK-CONTAINED radiation sources may soon be treating potatoes to lengthen storage life and prevent sprouting. Spiral chutes within unit tumble tubers for uniformity of exposure to Cobalt-60 rays.

Status of Food Operations As Air-Pollution Sources

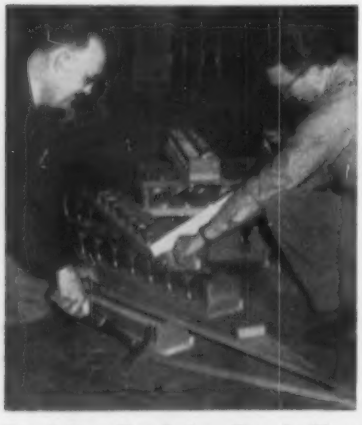
In a recent survey among odor-and-fume regulatory officials in 67 cities, "processing" stood fourth in number of mentions in a list of 17 prime sources of offense cited by the respondents.

Named first, second, and third were Chemicals, Vehicles, and Paint & Varnish. Fish and Breweries placed thirteenth and seventeenth, respectively.

Here is the full list, with percentage of questionnaires in which source was specified: 1. Chemicals 62%, 2. Vehicles 52%, 3. Paint & Varnish 49%, 4. Food Processing 47%, 5. Domestic 45%, 6. Rendering Plants 43%, 7. Plastics 33%, 8. Oil Refineries 31%, 9. Coke Works 31%, 10. Rubber 27%, 11. Steel 25%, 12. Insulation 21%, 13. Fish 21%, 14. Gas Works 19%, 15. Pharmaceutical 19%, 16. Soap & Detergents 17%, and 17. Breweries 15%.

Conducted by Pendray & Co., New York City public relations counseling firm, the study indicated a trend toward intensified enforcement to curb the unpleasant eminations, with 62% of the officials specifying actual plans. A total of 68% declared public interest in the problems is rising, and over 40% said complaints are increasing.

Six control methods, all having food-industry application, were cited: Absorption by washing, adsorption by activated carbon, catalytic incineration, direct-fired incineration, high-stack dispersal, and chemical-agent masking. But these means were commonly found "difficult and expensive," hence there was stress on need for more research.



Readying Food for Bomb Test

Brunt of an A-bomb explosion will be taken by these canned foods. And so they're being specially racked to afford equal exposure of every container. The blast check, slated in current Nevada tests, seeks to determine safety of foods after A-bombing, and thousands of samples of 60 different foods are involved (FE Mar., p. 197). Wielding hammer is American Can Co.'s George Sampson, while Charles Collier, of National Canners Assn., saws.

Plant Spending Gaged

Evaluation by the 8th McGraw-Hill Survey of Business Plans for New Plants & Equipment indicates 1955 capital expenditures by food plants (other than the beverage fields) will be up 10% over '54.

Study of these specific branches gaged bakery outlays as going up 15% and dairy expenditures rising 4%, while layouts in the meat field were judged as declining 12%.

The general picture is comparable with the performance of U. S. business as a whole, which plans to spend more than ever before on expansion and renewal.

Meanwhile, however, beverage spending is estimated to be down, going down as much as 45% this year—which gives the combined food and beverage industry a figure 7% off '54.

A budget breakdown indicates food processing will spend 33% of capital expenditure on expansion and 67% on new equipment during the year.

Seen in an outlook for the industry through 1958 is an increase in productive capacity of 9%. Sales growth by 1958 is expected to be 15%.

Oil Chemists Elect

Following are officers named by the American Oil Chemists' Society: President, W. A. Peterson, Colgate-Palmolive Co., Jersey City; Vice-president, T. H. Hopper, USDA, New Orleans; Secretary, R. W. Bates, Armour and Co., Chicago; and Treasurer, A. F. Kapecki, Wurster & Sanger, Inc., Chicago.

Still Fresh After 7 Yr.!

Keeping quality of irradiated meat is evidenced by this closeup of a Swift & Co. steak that was ray-sterilized back in 1948. It has been stored at room temperature ever since. The meat was on view at recent National Food Conference held in Hollywood, Fla.

Ready New Sugar Act

Since the administration hasn't come up with a sugar bill of its own to send to Capitol Hill, Congress has drafted its own version of a new sugar act, and it seems pretty sure of passage.

Senator Ellender, with 48 co-signers, has sent S.1635 to the Senate Finance Committee for consideration. The House has identical legislation.

Essence is a 188,000 net ton increase in the current sugar allotments, with 55% of any excess beyond that each year assigned to domestic producers and the remaining 45% divided between foreign producers—96% to Cuba and 4% to others.

The legislation, which will come up shortly, would be retroactive from Jan. 1, 1955.

Fiber Box Saves Lettuce $

Dry-pack shipment of lettuce in fiberboard cartons—instead of iced in wooden crates—is now reported bringing savings of up to $150 per car to Western growers.

Heads are either precooled under vacuum or preserved in transit with car-fans and bunker ice. Process is said to substantially reduce bruising and decay.

Hors d'Oeuvres

▶ Russia wants to learn the American way of corn-hog farming. First fact the Commies must digest is this: They'll have to treat their pigs better than they do their peasants.

▶ **From Japan comes something new to nibble on at cocktail time—French-fried grasshoppers. After three drinks one might have enough courage to try them.**

▶ Mistakes in hiring salesmen cost $6,000 each, reports American Management Assn. What price the mistake in hiring the man who formulates the product for the salesmen?

▶ **"Is that milk or cream?," asked the lady as the driver put the bottle on the doorstep. "Some people call it milk. Some people call it cream. Some people are right," was the $64 retort.**

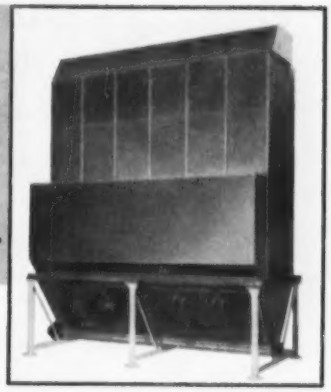
▶ Know what are "Spookies"? They are sweet pickles with a "haunting flavor."

▶ **Way back in 1784, continuous automatic flour milling was in operation near Philadelphia. What is this "new" thing called "automation"?**

▶ **Paper made experimentally from nylon fibers by Du Pont is three to ten times as strong as conventional paper, and is highly resistant to chemicals, molds, and bacteria. Maybe some day we'll have portable collapsible bins made of paper.**

ALL ALUMINUM CONSTRUCTION...

Simplified Modern Design



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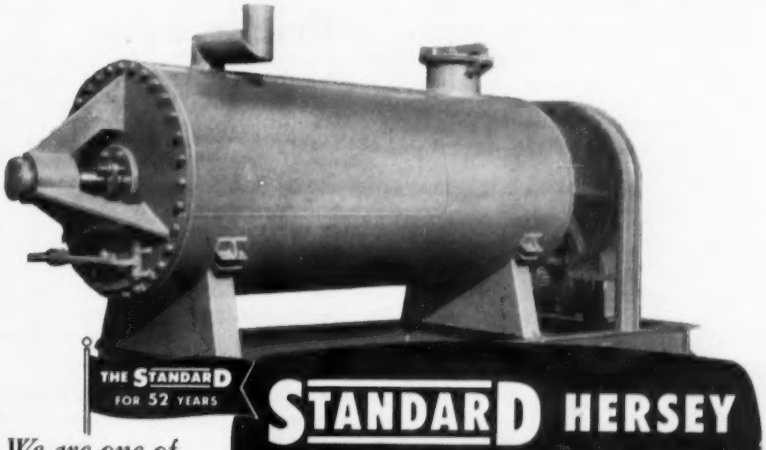

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Cold-Storage Body Maps 58-Point Research Plan

More federal-state industry cooperation in studying the freezing of fruits, vegetables, meats, poultry, and baked goods has been called for by the Cold Storage Research Advisory Committee.

The group's comprehensive 58-point program to guide researchers includes these prime channels for processors:

Frozen fruits and vegetables: Investigate enzyme actions effecting quality.

Also, study time-temperature stability and establish minimum packaging requirements.

Meats and poultry: Promote research into maintenance of low-bacteria counts on poultry. Look into methods for rendering lower-grade meats more desirable to consumers, and expand activity in meat bacteriology.

Baked goods: Increase work on storage requirements and packaging of frozen baked products.

Equipment: Investigate blast tunnel requirements (including air-velocities) needed for freezing different commercial-sized packages.

General: Develop frozen soybean products, investigate off-flavors in precooked frozen foods, and make economic studies of locker plants to develop the most successful operating practices.

Also set up audio-visual public education program relative to home-freezer factors in the use of frozen products.

The committee has re-elected Paul B. Christensen and H. C. Diehl as its chairman and vice chairman, respectively, for the ensuing year.

Gets Fritzsche Award

Dr. Hans Schinz

The Fritzsche Award & Gold Medal was presented to the 1955 winner – Dr. Hans Schinz, of Firmenich & Cie, Geneva, Switzerland, producer of organic synthetics for flavors–at the recent American Chemical Society gathering in Cincinnati.

Specially noted were Dr. Schinz' extensive chemical studies and valuable contributions relative to the chemistry of essential oils (FE Nov. '54, P. 210).

This is the third time this $1,000 award has gone to a Firmenich man.

Dr. Schinz has been in the oil research field for 30 yr., is author of numerous scientific papers, and further is laboratory chief at the Federal Institute of Technology, Zurich.

Candy Honor to Kroekel

C. Rudolph Kroekel, of Kroekel-Oetinger, Inc., Philadelphia, has been named winner of the Fifth Stroud Jordan Award, given by the American Assn. of Candy Technologists to the person making the most outstanding confectionery contributions.

Mr. Kroekel is particularly cited for his "efforts to stimulate and maintain interest in candy technology, during the past eight years, as chairman of the Research Committee of the Pennsylvania Manufacturing Confectioners Assn."

The notifying letter stated: "You have fulfilled the purpose for which the medal was established by likewise encouraging research on candy through the participation as a member of the National Confectioners' Assn. Research Committee. More than this, your tireless and sincere efforts on behalf of projects which benefit the candy industry as a whole are deeply appreciated."

Briefly . . .

● WINE distributed in '54 totalled a whopping 141,783,000 gal.–highest figure in history says Wine Institute. California wineries supplied 82½% of this total. Other states accounted for 13%, and foreign wine imports were 4½% (highest since 1944).

● BEER VS. A-BOMB was one highlight of a recent British Royal Navy atomic test. The trial blast vaporized two warehouses–but 18,000 cans of beer reportedly came through intact, uncontaminated and fit for consumption.

● CONTROL BY EMPLOYEES is planned at Nalley's, Tacoma, Wash., word having come that Marcus Nalley, founder and board chairman of the multi-product company, is releasing his majority stock interest to personnel. (For Special Report and foldout flowsheet on company, see FE Jan., p. 85 and 118.)

● SMOGLESS CAN COATING has been introduced at American Can Co.'s Vernon, Calif., plant, operations now being under way with first oven fully regulated against emission of gas and fumes. Installation is part of a $185,000 program to curb air pollution.

● APPLE PRODUCTS have recently been distributed in amounts greater than at any period in apple history–Pres. F. Yoder, Processed Apples Institute.

Appert Medal to King

Dr. C. G. King

This year's winner of the Nicholas Appert Medal, marking pre-eminence in food technology, is Dr. Charles Glen King. He will receive the honor at the annual meeting of the Institute of Food Technologists at Columbus, Ohio, in June.

This latest award by the Chicago Section of IFT pays tribute to Dr. King's distinguished work on vitamins, enzymes, synthetic fats, and other food constitutents. Further cited is his leadership in nutrition and other food-technology sciences, also his promotion of biochemistry and sanitation.

Following faculty work at Pittsburgh and Columbia, his long-time interest in nutrition culminated in his appointment to the Scientific Directorship of the Nutrition Foundation. Besides his activities with IFT, he has additionally contributed to work of the American Chemical Society, American Public Health Assn., National Research Council, and the American Society of Biological Chemists, of which he currently is president.

Gaging What America Eats

Kinds and quantities of food consumed in American homes, in relation to family size and income, is being determined in a special survey of some 6,000 homes, both rural and urban, in 42 states.

This checkup, first of its type since 1942, was scheduled to be launched by USDA as we went to press, and it is to be continued until June 30. National Analysts, Inc., a private marketing research firm, is handling the details.

Specific aim is to gain current facts for nutritionists, home economists, and market analysts in order to establish a basis for improving food use from the nutritional view and find whether large groups of families are low consumers of important foods.

Commodity Developments

Late USDA developments have concerned regulations respecting frozen strawberries, apple butter, canned asparagus, and egg products:

Frozen strawberries, both for manufacturing and otherwise, have now been combined into one grade. Also the term "by weight of strawberries"

TIME-TESTED FLAVORS for PICKLE PACKERS.....

You can now bring the fine art of pickle flavoring right into your own processing plant without resort to costly trial-and-error experimentation. How? By following a few simple suggestions and using the time-proven products of our laboratories—spicing specialties like those briefly described herewith. Into these fine materials have gone countless man-hours of painstaking scientific research, the results of which will enable you to produce a line of goods you'll be proud to label as your own. Write for test samples and working details concerning any of these products; also for FREE Flavor Data Sheets giving helpful information and suggestions for using our many dependable Pickle Spicing Compounds.

OIL DILL WEED—This outstanding specialty of our house has been used extensively by discriminating pickle packers for many years. It develops a well balanced, super-fine dill flavor.

OIL DILL PICKLE SPICE No. 1 and No. 2—These are often used in conjunction with Oil Dill Weed to produce supplementary spicing effects for both processed and pasteurized pickles.

OIL GARLIC—Here is a true garlic flavor, highly concentrated for use in Kosher type processed and pasteurized pickles.

OIL SOLUBLE GARLIC FLAVOR No. 20206—This is a convenient-to-use-and-handle dilution of natural Oil Garlic.

OIL DILL PICKLE SPICE "K" No. 1—A complete, well balanced Kosher type dill pickle flavor containing carefully blended Oil Dill Weed, Garlic and other spicing oils associated with this very popular flavor.

OIL PICKLE SPICE "K" No. 2—This highly concentrated combination of Oil Garlic and other spicing compounds will produce a very fine, characteristic Kosher-like effect. It may be used as a fortifier for Oil Dill Pickle Spice "K" No. 1; also in combination with Oil Dill Weed.

OIL SWEET PICKLE SPICE Nos. 1 to 14—These are attractive combinations of carefully selected spicing oils and oleoresins. Each produces an outstanding and characteristic flavoring effect at very moderate cost. Full descriptions of these individual flavors are available upon request.

OIL RELISH SPICE—A flavorful combination of standardized essential oils and oleoresins for producing attractive spice effects in relish mixes.

OLEORESIN TURMERIC—This dependably uniform, highly concentrated specialty of our house is recommended for use in processed and pasteurized pickles.

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For more information, use coupon on last page.

Schedule of Events

May

15–19—American Assn. of Cereal Chemists, annual meeting; Chase Hotel, St. Louis.
16–20—National Materials Handling Exposition; International Amphitheater, Chicago.
18–20—Dairy Products Educational Fair; Navy Pier, Chicago.
22–25—Flavoring Extract Mfrs. Assn., annual convention; Edgewater Beach Hotel, Chicago.
22–26—Assn. of Operative Millers; Jefferson Hotel, St. Louis.
23–25—American Management Assn., general management conference; Hotel Roosevelt, New York City.
25—Brookhaven National Laboratory, potato irradiation conference; Upton, Long Island, N. Y.
26—Packaging Institute, conference; Hotel Statler, St. Louis.
26—National Fruit & Syrup Mfrs. Assn., annual convention; Edgewater Beach Hotel, Chicago.
31–J3—International Bread Congress; Hamburg, Germany.

June

5–9—National Confectioners' Assn., convention & exposition; Conrad Hilton Hotel, Chicago.
5–17—National Assn. of Food Equipment Mfrs., sales & product training course; Michigan State College, East Lansing.
12–16—Institute of Food Technologists, annual meeting & exhibit; Deshler-Hilton Hotel, Columbus, Ohio.
19–J2—Annual Material Handling Training Conference; Lake Placid, N. Y.
20–22—Grocery Mfrs. of America, mid-year meeting; Greenbrier Hotel, White Sulphur Springs, W. Va.
21–23—American Dairy Science Assn., annual meeting; Michigan State College, East Lansing.
23–24—Processed Apples Institute, annual meeting; Greenbrier Hotel, White Sulphur Springs, W. Va.
24–26—National Assn. of Rabbit Producers, summer session; Hotel Fort Des Moines, Des Moines, Iowa.

has been clarified, and an additional Grade "C", or U. S. Standard, has been included with present grades.

Further, color factors are more clearly defined, and new percentage allowances permit more uniform interpretation of quality.

Apple butter color-requirement adjustments in each grade are up for revision, reports the Fruit & Vegetable Div. of Agricultural Marketing Service, USDA. Persons interested have until July 8 to write in their opinions to the Division, Washington 25, D. C.

Considered, too, is a standardized procedure for viewing the product when examining it for defects.

Canned asparagus standards revisions are proposed in respect to color, defects, and character. And these changes are open to views and comments of interested parties until June 30.

Egg products minimum sanitary regulations and processing instructions have now been combined into one publication similar to that for shell egg and poultry grading and inspection.

Also, the addition of the letters "USDA" in the uppermost corner of the shield design of the official identification has been effected to help reduce unauthorized use of the official inspection mark.

● ● ●

Break Batch Bottlenecks

—*Continued from page 65*

Model 8000 Silica-Gel, continuous, regenerating type air dehumidifier.

Hot air is forced upwards through a ductwork into perforated bin bottoms and through the product. This finishing operation requires about 12 hr. and must be done at carefully controlled temperatures to insure optimum quality of finished product.

Bins of dried product are moved by lift-truck and dumped into a feed hopper, serving a conveyor belt and elevator leading to the overhead Sweco separator. Separated as to sizes and shapes by screening and air classification, the finished product is inspected again and finally packaged for shipment.

All surfaces with which the product comes in contact are of stainless steel. These are so designed as to present minimum surface for product holdup or buildup. Belts, inspection tables, bins, elevators, weigh belt, slicing and spreading units are subjected to continuous cleaning and sanitizing. In addition, entire process clean-ups are routinely scheduled at regular intervals.

End (Resume reading on page 66)

Unit Engineering a Line

—*Continued from page 89*

ond fryer and are conveyed to a unique defatter. In this unit, they are agitated by a vibrating screen while a heated wind-blast is blown downward through them. The heat, plus air velocity, removes excess oil, leaving only that which was absorbed during frying—thus providing means for better control of surface oxidative changes.

French fries then drop onto a cooling belt, which carries them through an enclosed atmospheric cooler. From this unit they are conveyed to the belt-type freezing tunnels and frozen by a 100,000 cfm. wind blast of −30 deg. air.

Actions on Standards

Recent Standards actions taken by Government agencies, including the Agricultural Marketing Service (AMS) and Food & Drug Administration:

Cheese, Samsoe, proposed Standard of Identity to be considered by FDA, Mar. 10 *Federal Register*, p. 1454.

Fruits and vegetables, final promulgation by FDA of pesticide residue tolerances, Mar. 11 *F. R.*, p. 1473.

Peanuts, modification of import restrictions via Presidential Proclamation (FE Apr., p. 227), Mar. 15 *F. R.*, p. 1549.

Strawberries, frozen, revised AMS Grade Standards, Mar. 16 *F. R.*, p. 1580.

Peas, canned, proposed revision of AMS Grade Standards, Mar. 19 *F. R.*, p. 1662.

Fruits and vegetables, proposed tolerance for the pesticide heptachlor, Mar. 22 *F. R.*, p. 1703; final FDA tolerance for the pesticide Ses, Mar. 25 *F. R.*, p. 1820.

Eggs, dried whole, AMS grading and inspection regulation revision, Mar. 29 *F. R.*, p. 1864.

Pimentos, canned, proposed AMS Standards, Mar. 29 *F. R.*, p. 1893.

Cheeses, processed, cheese foods, spreads, and related foods, promulgation of FDA Standards of Identity, Apr. 1 *F. R.*, p. 2058.

Meat, meat products, revision of Agricultural Research Service fees for identification service, Apr. 2 *F. R.*, p. 2080.

Apple butter, proposed AMS Grade Standards, Apr. 8 *F. R.*, p. 2282.

Diced Potatoes: A continual flow of material from the shaker-grader comprises raw product for this line. When larger volume is needed, whole potatoes are routed, by conveyor, to the dicers. This product is used for frozen hash brown as well as dehydrated diced potatoes.

After dicing, material for hash-brown potatoes is hydro-conveyed to blanchers and, following cooling, to the freezer. Potatoes are loose-frozen in the belt-type unit, then chuted to the filling machine and cartoned. After casing, these are placed in low-temp storage.

Diced potatoes intended for dehydration are pumped to a dewatering screen, from which they drop onto the blancher belt and are automatically spread to desired thickness. After steam blanching (212 F.) for 3 min., potatoes are discharged to a tray-loader. This unit is equipped with a vibrator that insures a uniform feed to trays that pass on a chain conveyor beneath it.

Filled trays move to a stacker, which

automatically loads 25 trays on a transfer car.

Loaded cars are moved on rails to dehydrating tunnels. Temperature here is 165 F., and air volume is 100,000 cfm. The finished product, with moisture content of 10-12%, goes to the de-traying station, where the product is scraped off, and further dehydrated in finishing bin-dryers at 110 F., then packaged.

Controls of dehydration tunnels are set for 108 F. wet- and 165 F. dry bulb. Those in the bin-drying department are 60 deg. F. wet and 110 deg. F. dry-bulb.

Potato patties are one of the newest products. They are produced by strip-cutting peeled, trimmed tubers into shreds .These are blanched in 205 F. water, then fed to a metering device, integrated with a dual dump system for proportioning the shreds with premixed patty flavoring material. This is followed by blending in a mixer. Mix is conveyed to a series of modified patty formers (similar to those used for hamburgers) and molded into square units.

Machines are timed to deliver patties in single file on a conveyor belt. A rake-off bar removes them from this belt and gently deposits them on the freezer belt, where they are frozen, (−30 F., for 20 min.), then manually cartoned, cased, and stored.

Bibliography

1. Olsen, R. L., "Recent Advances In Potato Granule Technology," *Food Technology*, 1953, Vol. VII, No. 4, pp. 177-181.
2. Neel, G. H., *et al*, "Drying Problems In the Add-Back Process for Production of Potato Granules," *Food Technology*, 1954, Vol. VIII, No. 5, pp. 230-234.

Acknowledgment is made to Western Regional Utilization Branch, USDA, for its cooperation in development of the bone-dryer and fluidized bed-dryer.

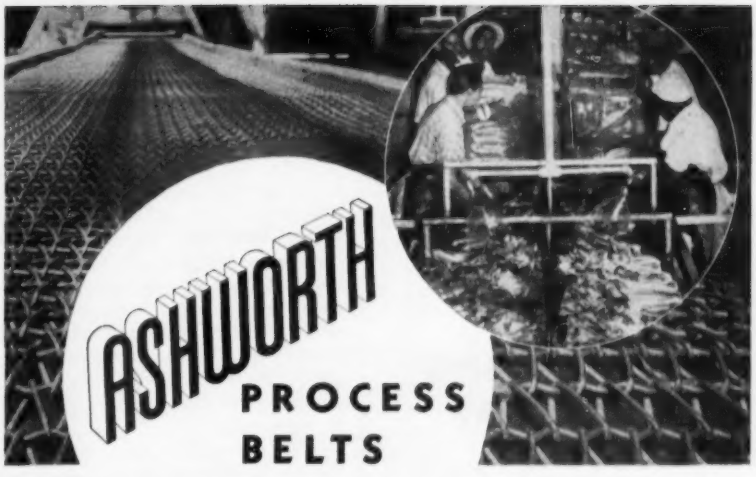
End (Resume reading on page 90)

Uses Camera as Tool

—Continued from page 93

We even use this photo-inspection technique to aid in working out suggestions and carrying out new installations. For example, films helped us on the details of a suggestion we adopted whereby obsolete equipment was temporarily put to use to keep a production line running until we received new advanced units we'd ordered.

As for installations—for instance of a rotary cutter we'd purchased for experimental purposes—photos of the crated equipment drew attention to how long it had been stored. And action then came fast.



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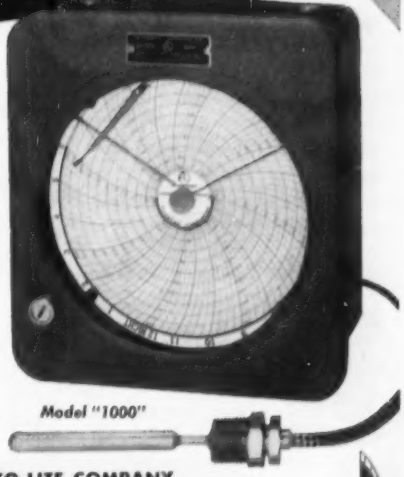

Model "1000"

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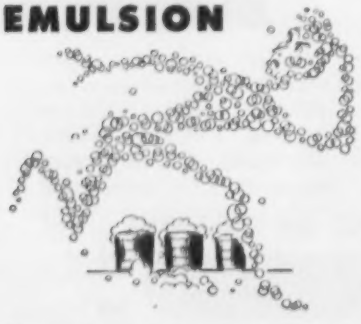

Given a chance, a Dow Corning silicone defoamer almost always gets its man... restores productive capacity previously wasted on foam . . . reduces processing time . . . eliminates hazardous boil-overs . . . and at very low cost. For example:

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The more easily dispersed Antifoam AF Emulsion and its parent product, Antifoam A Compound, are physiologically harmless. Effective at low concentrations against the widest variety of foamers, they pay for themselves many times over.

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We not only picture-illustrate messy or inefficient situations to make personnel aware of defects in the plant, but also shoot films of orderly and efficient methods for morale-boasting purposes.

A picture-stimulating system is easy to carry out. In our specific case, pictures are snapped as needed—every month or every other month. After being developed, they go to Plant Superintendent John Pinta, with comments written on the front or back of each.

He then calls into his office the supervisors of the departments in which the photos were taken. They are given the films, along with helpful instructions.

After doing their work—toward correcting faulty conditions, spurring advance practices, or whatever—these photos are returned to Plant Superintendent Pinta. They now carry additional comments on the back.

These may read: "Corrected immediately," or "Can't do anything until electricians complete work," or "Idea of temporarily using obsolete hoist in rendering room is practical."

Factors in Filming

As for taking pictures, we usually avoid using flashbulbs so as not to distract the attention of our workers or interfere with production-line operations.

To do this, we use a fast camera lens, highspeed film, and a specific developing technique.

Camera employed is a Model 3-F Leica with a fast f.2 Summicron lens. Helping us, too, in snapping pictures under existing plant-light conditions—and without need of flashbulbs—is a new, very fast film, Eastman's Royal Pan. Since it is several times faster than the formerly-employed film—Eastman Super XX—less exposure is required and only half the amount of light.

We are, at present, experimenting with Leica's new Model M-3 camera. And if experience with it "proves out," we likely will come to use it full time.

We've tried out many developers, including Eastman's D 76—an old standby among amateur photographers. Finally chosen was Eastman's D 23, which enabled us to take advantage of, rather than lose, the speed benefit of our selected film. And we also get finer grained enlargements.

Further, a Polaroid-Land Pathfinder camera might be considered. Here, there is the particular point that its prints are immediately available for the various department heads. And new fast film has now been developed for this camera.

End (Resume reading on page 94)

Cathode Raying Eggs, Milk

—*Continued from page 79*

further behind as treatment levels increased. And prior calcium addition had no effect on rate of rennet coagulation following treatments.

Reduction in available calcium, which is apparent in the rennet reaction rates, is probably the principal cause of casein's decreased heat stability. And since this milk is readily coagulated by heat, reduction in stability would be an important consideration in applying ray sterilization.

Destruction of enzymes in foods requires some ten times the radiation dose required to kill microorganisms. Therefore, heat would probably be employed to inactivate them in foods to be sterilized by ionizing rediations. Thus, the decreased heat stability of this milk must be considered in such a process.

Taste panel evaluations of irradiated milk showed conclusively that undesirable flavor changes had occurred. Comparison with milk that had been heated at 185 deg. F. for 10 min. indicated that some similarity existed between the two off-flavors.

End (Resume reading on page 80)

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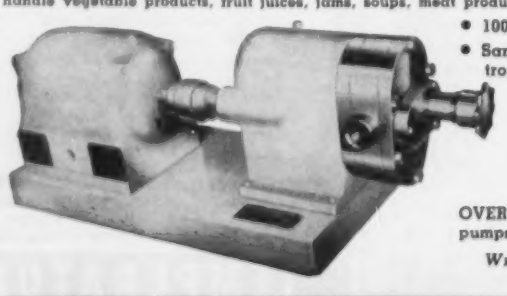

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Recent Inventions

PRODUCTS

Infant Food Containing Hog Gastric Mucin—R. M. Tomarelli, Lansing, J. B. Hassinen and G. T. Durbin, Mason, and F. W. Bernhart, Holt, Mich. to American Home Products Corp., N. Y. C. No. 2,697,663. Dec. 21, 1954.

Starch Composition With 1-5% Monohydric Aliphatic Alcohol Containing 10-14 Carbon Atoms—P. Kass to Atlas Powder Co., Wilmington, Del. No. 2,698,255. Dec. 28, 1954.

Starch Formulation Having Sugar, Acid From Adipic and Fumaric Groups—J. L. Common, Rutherford and H. A. Campbell, Denville, N. J. to General Foods Corp., N. Y. C. No. 2,698,830. Jan. 4, 1955.

Skinless Frankfurters by Enclosing Comminuted Meat in Water-Insoluble Casing, Linking, Separating Links by Carboxymethylated Cellulose Ties Which Disintegrate at Cooking Temperature, Cooking—D. E. Rueckert, Mokena and S. D. Luce, La Grange to Swift & Co., Chicago. Nos. 2,698,800–801. Jan. 4, 1955.

Starch Conversion Products by Agitating Under Vacuum Finely Divided Starch, Acidifying With Hydrogen Chloride Gas, Dehydrating to Below 1% Moisture, Degrading by Heat, Cooling—M. A. Staerkle, Baech and E. Meier to Blattman & Co., Waedenswil, Switzerland. No. 2,698,818. Jan. 4, 1955.

Baker's Yeast From Pentose Medium by Inoculating With Saccharomyces cerevisia, Adding Nutrient Salts, Aerating—K. Bernhauer, Lorsch to Aschaffenburger Zellstoffwerke A. G., Redenfelden, Germany. No. 2,698,827. Jan. 4, 1955.

Conjugated Fatty Acids from Monoolefinic Compounds Containing 8-22 Carbon Atoms—R. C. Arnold, St. Paul, Minn. to General Mills, Inc. No. 2,698,857. Jan. 4, 1955.

Stabilized Glyceridic Oils Containing Aliphatic Tricarboxylic Acid Dissolved in Polyhydric Alcohol Ester—C. F. Brown, Jersey City, N. J. and C. M. Gooding, Staten Island, N. Y. to Best Foods, Inc., N. Y. C. No. 2,699,395. Jan. 11, 1955.

Wax Composition for Produce Comprising Paraffin, Oil-Soluble Heat-Reactive Phenol-Aldehyde, Terpene Resin, Sugar-Cane Wax—C. D. Cothran to Brogdex Co., Pomona, Calif. No. 2,700,025. Jan. 18, 1955.

PROCESSES

Reducing Shrinkage in Irish Potatoes by Treating With 2:1 Mixture of Ethylene Dichloride, Trichloroethane—H. J. Keller, Dunedin, Fla. to Clinton Foods, Inc., N. Y. C. No. 2,698,246. Dec. 28, 1954.

Sterilizing Containers and Aseptically Filling With Pre-Sterilized Fluid—E. B. Fairchild to L. W. Potts and M. Arent, Santa Barbara, Calif. No. 2,698,120. Dec. 28, 1954.

Readapting Saccharomyces cerevisia Yeast from Pentose to Hexose Medium by Adding to Hexose, Subjecting to Alcoholic Fermentation Without Multiplication of Yeast Cells—K. E. Bernhauer, Lorsch and E. M. Becher, Stockstadt to Aschaffenger Zellstoffwerke A. G., Redenfelden, Germany. No. 2,698,828. Jan. 4, 1955.

Controlling Germination of Cereal Grains by Chitting, Acidulating Below pH 6, Treating With Plant Hormone to Complete Germination—B. B. Stoller to Pabst Brewing Co., Milwaukee, Wis., No. 2,698,275. Dec. 28, 1954.

Puffing Cereals by Gas-Heating Grains to 212-350 F., Cooling to Below 212 F., Exploding in Steam Zone.—E. G. Rupp, Clarendon Hills and W. F. Proescholdt, Western Springs, Ill., to Quaker Oats Co., Chicago. No. 2,698,799. Jan. 4.

Preserving Lettuce by Dipping in Cold Distilled-Water Solution of Potassium Nitrate, Sodium Benzoate—S. L. and C. Crisafulli, Oswego, N. Y. No. 2,698,804. Jan. 4, 1955.

Clarifying Carbohydrate Fermentation Solutions by Cooking Cereal Grains, Adding Diastatic Enzyme, Agitating, Settling Protein Floc, Removing Supernatant Fluid—E. M. Frankel, Nyack, N. Y. No. 2,698,825. Jan. 4, 1955.

Cooling Leaf Vegetables Having Surface Moisture by Subjecting to High Vacuum to Reduce Temperature to 32 F.—R. L. Brunsing to Vacuum Cooling Co., San Francisco. No. 2,699,048. Jan. 11, 1955.

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Condensing Whey by Concentrating Partially Delactosed Whey, Adding Fatty Material and Sugar, Heating Under Vacuum to 70-80% Solids—M. E. Hull, La Grange, to Armour & Co., Chicago. No. 2,699,955. Jan. 18, 1955.

Dehydrating Eggs or Citrus Juice by Chilling to Below 40 F., Atmospheric and Spray Drying—E. O. Sargent, Oxnard, Calif. No. 2,699,996. Jan. 18, 1955.

Detecting Blood in Eggs by Photoelectric Effect of Light Passed Through Sample—A. W. Brant, Hyattsville and K. H. Norris, Beltsville, Md. to USA. No. 2,700,321. Jan. 25, 1955.

Want more information on any of these recent patents— If so, you may obtain detailed printed copies by writing direct to the U. S. Patent Office, Washington, D. C., giving serial numbers of those you want and enclosing 25¢ for each copy.

Defeathering Poultry by Scalding Whole Carcass, Then Scalding Back of Poultry at Higher Temperature—J. Adams and M. I. Darrow to Swift & Co., Chicago. No. 2,700,792. Feb. 1, 1955.

EQUIPMENT

Poultry-Holding Shackle Consisting of Member With Pair of Spaced, Normally Closed, Leg-Receiving Perforations, Upwardly Extending Side Elements, Spaced Above Suspension Means.—R. S. Zebarth, Hickman Mills, to Gordon W. Johnson Co., Kansas City, Mo. No. 2,696,246. Dec. 21, 1954.

Egg-Weighing Turret Having Vertical Stationary Spindle, Rotatable Platform, Plurality of Scale and Basket Assemblies, Pivotally Mounted Balance Beam, Cam-Engaging Lever, Cam Tracks.—R. C. Sneed, Piedmont to Safeway Stores, Inc., Oakland. No. 2,697,516. Dec. 21, 1954.

Frying-Fat Filter Comprising Closed Container, Filter Bag, Upper Storage Compartment for Filter Aid, Means for Mixing Latter with Hot Fat, Product Recovery Port.—J. A. Norton, Hermosa Beach to Frysweet Filter Corp., Los Angeles. No. 2,698,092. Dec. 28.

Fruit Picker Comprising Frame, Driving and Intake Rollers, Discharge Opening, Actuating Means—B. K. Hollister, Seattle, Wash. No. 2,698,508. Jan. 4, 1955.

Multi-Stage Fruit Sizer Each Stage Comprising Endless Belts, Flexible Disks Mounted on Horizontal Shaft—R. L. Miller, Utica, Mich. No. 2,699,253. Jan. 11, 1955.

Milk Can Washer Having Treating Rows, Sprays, Receiving and Switching Platforms, Oscillatory Member—M. J. Peters to Damrow Bros. Co., Fond du Lac, Wis. No. 2,698,624. Jan. 4, 1955.

Electrical Precipitator for Separating Suspended Matter From a Gas Stream—H. A. Wintermute, Plainfield, N. J. to Research Corp., N. Y. C. No. 2,698,669. Jan. 4, 1955.

Pear Feeding, Stem-End Trimming and Transfer Means in Rotary Turret-Type Machine—W. de Back and S. Puccinelli to Food Machinery & Chemical Corp., San Jose, Calif. No. 2,699,191. January 11, 1955.

90-Deg. Turntable Conveyor With Vertically Pivoting Element, Lever Arm, Motor-Driven Crank, Link, Switch-Actuating Member—K. M. White, Zanesville to Armco Steel Corp., Middletown, Ohio. No. 2,699,247. Jan. 11, 1955.

Grain Grader Having Air-Stream Means for Separating Into Heavy, Light Fractions—H. A. Bok, Aerdenhout, Netherlands. No. 2,699,254. Jan. 11, 1955.

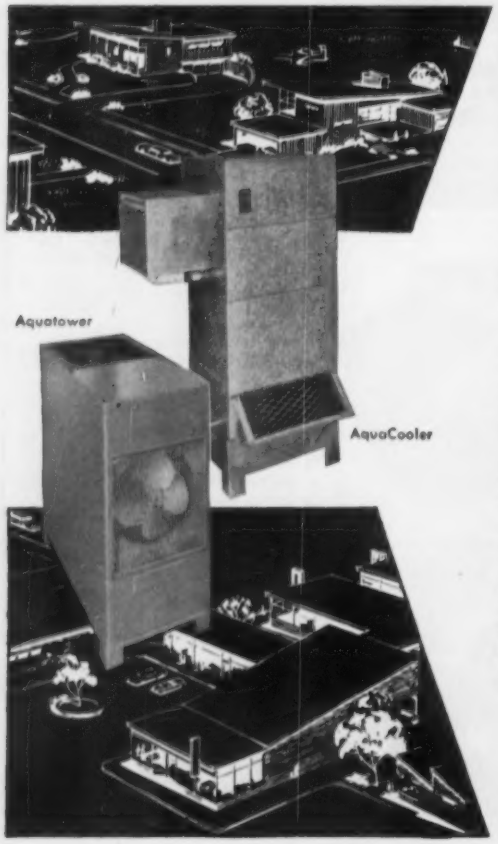
Egg Scale Counterweight for Graders Comprising Shell With Enclosed Granular Material—W. C. Bean, Glendale, Calif. No. 2,699,329, Jan. 11.

Casing Stripper for Sausage Links Consisting of Conveyor, Cutter, Transversing Wipers, Guide Means—C. M. Chambers, and R. L. Meeks, Phoebus, Va. No. 2,699,570. Jan. 18, 1955.

Sausage Casing Cutter Having Shroud With Hemispherical End and Aperature, Adjustable Projecting Heel—R. L. Meeks to C. M. Chambers, Phoebus, Va. No. 2,699,571. Jan. 18, 1955.

Bacon Injector on Conveyor With Means for Indexing Belt and Reciprocating Syringes—S. C. Moreland and W. V. Haffield, Indianapolis. No. 2,699,717. January 18, 1955.

Dough Sheeter Comprising Oppositely Rotating Rollers with Inner Metallic Load-Sus-



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The Marley Company MARLEY
Kansas City, Missouri

taining Core, Outer Tetrafluoroethylene Sleeve—M. A. Stickelber, Kansas City, Mo. to Stickelber & Sons, Inc. No. 2,699,737. Jan. 18, 1955.

Peanut Skinner Having Coplaner Rolls Forming Narrow Gap, Slitting Knives—J. W. Gardner, Tyrone, Pa. No. 2,699,806. Jan. 18, 1955.

Apple Cellar, Slicer With Vertical Rotary Spindle Adapted to Receive Cored Fruit, Transmission Means, Juice Passageway—J. E. Lindsay to F. B. Pease Co., Rochester, N. Y., No. 2,699,807. Jan. 18, 1955.

Tomato Peeler Comprising Rotating Drum, Circumferential Slots, Peeling Rolls With Elastic Contact Surfaces—M. W. Low, Connersville, Ind. No. 2,699,808. Jan. 18, 1955.

Vacuum Filter for Pulps and Slurries, Having Tank, Rotating Filter Assembly, Circulating Impeller—W. H. Kelsey, Stockton, Utah. No. 2,699,872. Jan. 18, 1955.

Drum Lifter With Spaced-Apart Floor Supports, Attached Inwardly Curving Track, Rollers—F. Nebeling, Remscheid, Germany. No. 2,699,913. Jan. 18, 1955.

Checkweigher Comprising Beam With Load-Supporting Member, Air-Jet Nozzles, Expansible Bellows, Valve, Actuating Means—M. Knobel, Boston to Pneumatic Scale Corp., Quincy, Mass. No. 2,699,932. Jan. 18, 1955.

Coffee Roaster Consisting of Cylinder, Bin, Feed Drum, Automatic Loading Means, Temperature Control—H. Schmidt and A. P. Hobush to Incoro, Inc., Kingston, N. Y. No. 2,700,225. Jan. 25, 1955.

Cream Centrifugal Valve Having Continuous Annular Spring, Interconnected Coils Defining Annular Space, Sealing Element—W. H. Harstick, Oak Park, Ill. to International Harvester Co. No. 2,700,392. Jan. 25, 1955.

Pallet Supporter Having Double-Ended Socket With Sides, End Walls, Abutment Plate, Attaching Means—L. F. Skubic, Beverly Shores, Ind. No. 2,700,520. Jan. 25, 1955.

Pallet Separator Consisting of Pair of Symmetrically Crossed Upstanding, Vertically Offset Rectangular Plates That Form Four Compartments—S. D. Lapham, Martinez, Calif. No. 2,700,521. Jan. 25, 1955.

Heat Exchanger for Flocculent or Granular Material—H. Miller, Kansas City, Missouri to Archer-Daniels-Midland Co. No. 2,700,533. Jan. 25, 1955.

Cheese Trimmer With Horizontal Platform, Knife Blade, Roller, Adjusting, Actuating Means—F. Aberlin to Kraft Foods Co., Chicago. No. 2,700,821. Feb. 1, 1955.

Dough Extruder Consisting of Forming Tube, Spreader, Strip Divider, Cutter—I. W. Bradshaw, Philadelphia. No. 2,700,942. Feb. 1, 1955.

PACKAGING

Bottle Carrier Made From Integral Blank Folded to Form Adhesively Joined Side Walls, Gusset-Fold Bottom Support, Handle Member—O. L. Vines, N. Y. C. No. 2,695,127. Nov. 23, 1954.

Device for Packing Articles Between Two Continuous Sheets of Heat-Sealable Plastic—H. I. Toews, Lynwood, Calif. No. 2,695,483. Nov. 30, 1954.

Removable Bottle Cap Having Downturned Corrugated Skirt, Cork Insert, Plate, Inner Percussion Cap.—A. L. Faccou, Santa Ana, Calif. No. 2,695,720. Nov. 30, 1954.

Filler for Free-Flowing Solids Comprising Feed Hopper With Inner Baffle Walls, Thimble Member, Rotable Valves, Discharge Opening—W. M. Royer to A. E. Staley Mfg. Co., Decatur, Ill. No. 2,695,742. Nov. 30, 1954.

Double-Walled Carton With Upwardly Opening Outer Casing, Foil Metal Liner Inwardly Spaced to Form Insulated Air Space, Telescoped Flanged Cover—S. E. Gatuso, Ozone Park to A. and P. Capizzi, Brooklyn, A. J. Pantano, Franklin Square, and J. Radosti, Corona, N. Y. C. No. 2,695,744. Nov. 30, 1954.

Bottle-Counter With Housing Member, Toothed Wheel, Pendulum, Latch, Locking Means, Stop Members, Indicating Means—S. P. Radeloff and R. J. Falcone, Philadelphia. No. 2,695,751. Nov. 30, 1954.

Baking Dough Package Comprising Tube Formed from Single Sheet of Flexible Paperboard Tightly Coiled Into Plurality of Superposed Separable Convolutions, Ends Caps—G. N. Fisher, Wilmette to Kraft Foods Co., Chicago. No. 2,695,847. Nov. 30, 1954.

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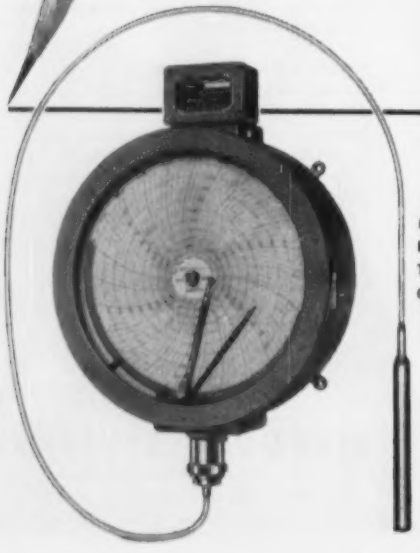

Model RVS
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Carton Sealer With Inverting Mechanism, Closing Plate With Flat Upper Surface, Transfer Device—P. E. Fischer, Minneapolis to General Mills, Inc. No. 2,696,245. Dec. 7, 1954.

Cap Unscrambler Consisting of Inclined Extending Member With Curved Cross Section, Delivery Chute, Vibrating Means—P. Zenlea, Forest Hills, N. Y. No. 2,696,285. Dec. 7.

Closure Having Flat Cap, Axial Inner-Tubular Part, Flat Bottom and Peripheral Annular Sections—G. A. Kihm, Collonges-au-Mont-d'Or, France. No. 2,696,318. Dec. 7, 1954.

Filler With Flat Base, Upright Frame With Vertical Groove, Slidable Extension, Hinged Section, Funnel Molded Integral With Short Arm Which Fits Over Extension—W. P. Van Drunen, South Holland, Ill. No. 2,696,336. Dec. 7, 1954.

Carton-Feeding Mechanism Having Stack-Support Means, Controls for Successively Withdrawing Foremost Cartons, Periodically Advancing Stack—L. G. Bateman to Delamere & Williams Co., Ltd., W. Toronto, Ont., Canada. No. 2,696,381. Dec. 7, 1954.

Wrapping Machine With Means for Successively Applying, Folding, and Heat-Sealing Article Wrap—W. T. Martin, Canajoharie, N. Y. to Beech-Nut Packing Co. No. 2,696,702. Dec. 14, 1954.

Piston Filler Comprising Hopper, Filling Tube, Movable Gate, Reciprocating Advancing Member, Fluid-Pressure Means, Controls—D. M. McBean, Rochester and L. C. Tallman, Churchville, N. Y. to McBean Research Corp., Rochester, N. Y. No. 2,696,776. Dec. 14, 1954.

Stop Mechanism for Jar Filler Consisting of Push Rods, Microswitches, Fulcrum Shaft, Control Lever—M. Kruppe to Nalley's Inc., Tacoma, Wash. No. 2,696,903. Dec. 14, 1954.

Bottle Crate Unloader Having First and Second Conveyors, Bottle-Engaging, Release Members—B. Copping to Atkron, Inc., Cuyahoga Falls, Ohio. No. 2,696,927. Dec. 14, 1954.

Dispensing Container With Perforate Area Uncovered by Pivoted Flexible Strip—F. J. Obeck, Haddonfield Twsp., Camden County, N. J. to R. T. French Co., Rochester, N. Y. No. 2,696,935. Dec. 14, 1954.

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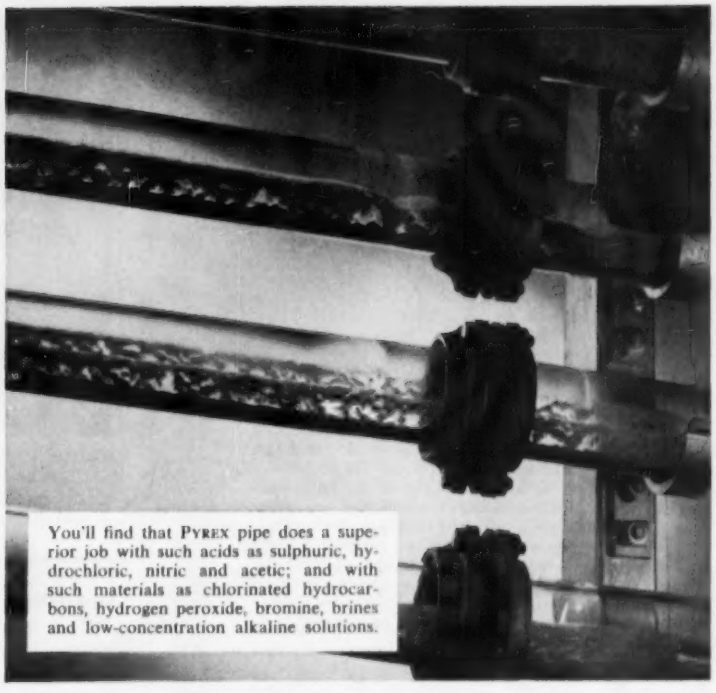

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Over 75% of the PYREX pipe now in use has been installed by our customers' own pipe fitters. It is easier to hang than many other kinds of corrosion resistant pipe. There are no special hard-to-catch-onto tricks about it. Our installation manual covering every detail is yours for the asking.

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To offset strain, all PYREX pipe ends and fittings (except U-bends) are now tempered, which makes them much stronger than annealed fittings. They are strong enough to drive nails with.

Cuts maintenance problems

The liquid-smooth surface of PYREX pipe does not pit. It stays cleaner longer. When cleaning is necessary, it is easy; for you can see the interior of the pipe at all times.

One plant superintendent said, "Since PYREX pipe was installed for all of our product lines, maintenance has been practically nil."

What does it cost?

Initial cost of PYREX pipe compares favorably with most other corrosion resistant piping . . . is lower than some. Low installation and maintenance cost and long-time service put PYREX pipe far on the economy side of your plant budget.

More information for you

For more information to help you judge the advantages of PYREX pipe, let us send you any or all of the bulletins listed in the coupon below. Or, if you prefer to discuss your own specific problem immediately with one of our representatives, write, wire or phone us.

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Please send me the bulletins checked below:

- ☐ EA-1: "PYREX brand glass pipe in the Process Industries" (Illustrated case histories)
- ☐ EA-3: "PYREX brand 'Double-Tough' Glass Pipe and Fittings"
- ☐ PE-3: "Installation Manual for PYREX brand 'Double-Tough' Glass Pipe"
- ☐ Please have your representative call on me.

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For more information, use coupon on last page.

if it contains MILK it could be our *baby*

If your product contains milk solids, or is used with milk, SeaKem "Colloids Out of the Sea"* may be able to *improve body and texture, make more desirable gels, suspend component ingredients more effectively.* The stabilizing advantages of SeaKem Colloids have been clearly demonstrated in a wide variety of such products, including chocolate milk, milk base pie fillings, milk puddings, milk shake mixes, syrups and frostings.

For instance, application in milk puddings and pie fillings goes all the way from the use of a straight SeaKem Irish Moss extractive without eggs to produce a light bodied custard or blanc mange, to combinations with cornstarch, with tapioca starch, or with blends of starches. When used as a starch modifier, benefits are as follows:

1. Pudding or filling is lower in viscosity during cooking. Thus heat transfer is better and scorching over direct heat is minimized.
2. The "set" comes in part from the SeaKem Colloid. Gel forms only on cooling. Boiling temperatures, as required for starch, are not necessary to activate the Irish Moss extractive. Yet if the milk is boiled, there is no injury. Thus the housewife or baker obtains a pudding or pie filling more uniform in texture, even when overcooked or undercooked.
3. Setting time is fast, cutting length of period from preparation to serving.
4. Puddings may be unmolded easily for formal service, or for ease of serving from large batches. Pie servings are made "non-runny."
5. Common and objectionable surface skin is greatly reduced. Marked improvement in this respect is especially noticeable in chocolate flavors.
6. Unsurpassed texture and eating quality is achieved. No tendency towards pastiness and no starchy flavor. End product spoons well.

*SeaKem is the registered trademark for the standardized hydrocolloids obtained from Irish Moss by the Seaplant Chemical Corporation. Extracted and refined by rigidly controlled processes which insure dependable uniformity and purity, SeaKem Colloids are light amber to colorless, free-flowing flaky powders. Available in a variety of types suitable for a wide range of stabilizing functions, SeaKem Irish Moss extractives have won acceptance with leading food manufacturers on the basis of their unique contributions.

"Drop in to see us at Booth #62 at Food Technology Meeting in Columbus, Ohio, June 12 — 16".

Serving industry with "Colloids Out of the Sea"

Seaplant CHEMICAL CORPORATION

63 David Street, New Bedford, Mass.

Men & Companies

William P. Hodgins (right), Dole plant manager in Honolulu, has been appointed director of industrial relations. **Dr. Melvin L. Levine** (left), former director of research and quality control, will take over the post of plant manager.

Industry

Bowman Dairy Co., Chicago, has acquired **Walter Hoff Dairy** and **Huebner Quality Dairy,** both in Saginaw, Mich.

Campbell Soup Co., Camden, N. J., and **C. A. Swanson & Sons,** Omaha, have announced plans to affiliate through an exchange of stock.

Excelsior Quick Frosted Meat Products, Inc., plans a 12,000-sq. ft. expansion of its Long Island City, N. Y., plant.

Findlay Sugar Plant, closed since 1950, will be opened this year under operation of **Northern Ohio Sugar Co.**

General Foods Corp. has begun production of Kool-Aid in its San Leandro, Calif., plant.

Gerber Products Co. has agreed to acquire outstanding capital stock of **Gerber Plastic Co.,** St. Louis, in exchange for Gerber Products' stock.

Gorton-Pew Fisheries, Gloucester, Mass., and **Quincy Market Cold Storage & Warehouse** have signed agreements for joint construction and operation of a modern storage and processing plant.

Theo. Hamm Brewing Co. is expanding its San Francisco plant in a $1 million program designed to boost capacity to 840,000 bbl.

Instant Milk Co. Ltd., Canada, has been incorporated by federal charter, with head office to be in Toronto.

Iroquois Beverage Corp., Buffalo, is being sold and its operations merged with **Frankenmuth Brewing Co.** to form **International Breweries, Inc.**

Libby, McNeill & Libby of Canada Ltd., is building $300,000 administration building in Chatham, Ont.

Thomas J. Lipton, Inc., is constructing new blending and packaging plant in Suffolk, Va.

Mid West Food Packers, Inc., Fowlerton, Ind., has been purchased by a group of Indiana canners and business men.

Modern Maid Food Products Co., Inc., has opened a new processing plant in Jamaica, N. Y.

Paisley Products, Inc., Div. Morningstar, Nicol, Inc., has purchased inventory of **Scriptex Adhesive Products Co.,** Philadelphia and transferred manufacturing operations to N. Y. C.

Swift & Co., has purchased **Holiday Food Co.,** of Van Buren, Ark., also **So-Way Sales Co.** and **Art-Mo Transportation Co.,** both of Kansas City.

Viviano Foods, Inc., has changed its corporate title and brand name to **Vevco Foods.**

Workman Packing Co., San Leandro, Calif., has been purchased by San Francisco Bay area interests and will be operated under name **IXL Food Co.**

Personnel

E. V. Anderson has been elected to the board of H. J. Heinz Co. of Canada.

Robert E. Bryant has been named manager of Wilson & Co.'s Memphis plant.

James W. Carkner, chairman of Pepsi-Cola Co.'s board, has been elected board chairman of Pepsi-Cola General Bottlers, Inc.

Silvio Crespo is now laboratory director of Hooton Chocolate Co., Newark, N. J.

E. Floyd Forbes of San Francisco has been re-elected president and general manager of Western States Meat Packers' Assn.

Stanley A. Frankel, assistant to president of Esquire-Coronet magazines, is now a director of Rockwood & Co., Brooklyn.

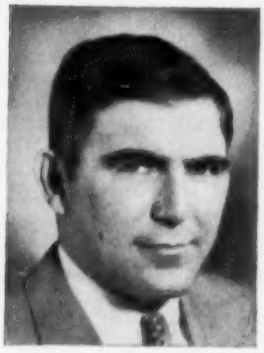
W. H. Glenn, former director and treasurer of Nehi Corp., has been elected president succeeding C. C. Colbert.

J. Neil Gordon has been named secretary of Proctor & Gamble Co. of Canada Ltd.

Joseph R. Harmon, secretary and general counsel of Hunt Foods, has been given the added title of vice-president.

E. J. Hohhof is now laboratory director for H. J. Mayer & Sons, Inc.

George Hampton has been elevated to post of executive vice-president of General Foods Corp.



Dr. B. David Halpern, former president of Monomer-Polymer, Inc., Leominster, Mass., has been named research director of Borden Co.'s Chemical Div. Research Lab in Philadelphia.

William J. Megowen is now president of Megowen-Educator Food Co., Lowell, Mass. He is also v.-p. and director of Salerno-Megowen Biscuit Co., Chicago.

Arthur W. Lutz, former chairman of the board of Smart & Final Iris Co., has been appointed to the board and executive committee of Consolidated Foods Corp.

Max A . Miller and **Henry Offutt** have been named to the board of directors of Morton Packing Co.

Sherman Morse, Jr., and **A. J. Jefferson** have been named assistant vice-presidents of Beech-Nut Packing Co., Canajoharie, N. Y.

Raymond W. Peters, formerly first vice-president of Griesedieck Bros. Brewery Co., St. Louis, has now been elected chairman of the board of directors.

J. N. Peterson, president of Smart & Final Iris Co., is now also chairman of the board, replacing Arthur Lutz. (see above).

Melvin D. Ross has been re-elected president of M & R Dietetic Laboratories, Inc.

Harry E. Strong has been named v.-p. of City Products Corp., Chicago.

Tom Swan, formerly with Sierra Candy Co., has been appointed vice-president and general manager of American Brands Corp.

Dudley Swim has been elected to board of directors of California Packing Corp.

Terry Taylor has been named manager of General Mills' plant in Lodi, Calif.

T. C. Thompson has been elevated to director of marketing of Reddi-Wip, Inc., Los Angeles.

How to get the advantages of a Fast, Work-Saving MEAT TRACKING System

And Cut Installation Costs To The Bone, Too

You can do it exactly as this large meat distributor did. Have your refrigeration or general contractor install a Philadelphia Tramrail PRE-FABRICATED Meat Tracking System in your packing or cold storage plant or abattoir. The illustration above shows just a part of the system this distributor installed at substantial savings.

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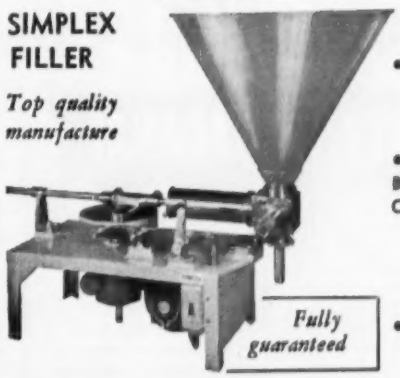

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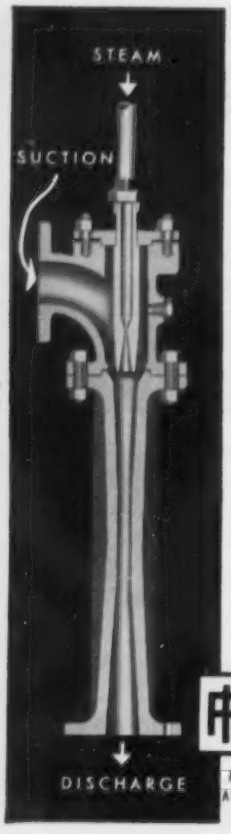

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Ingersoll-Rand steam jet ejectors are the *simplest* and most economical means of producing many types of vacuum. Their single, one-piece nozzle eliminates any possibility of internal leakage and wasted steam.

Whether your application calls for a 1" or 66" suction I-R ejector, you can be sure you're getting all the vacuum that your steam can produce. It will pay you to check the I-R points of superiority before making your next ejector installation. Write us for Bulletin 9013-A.

4-130

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ACANAL is Garland's new coating that protects from the corrosive action of acids, alkalis, fruit juices, salts, petroleum products or alcohol. Paint it on tanks, chemical equipment, piping, machinery, structural steel, air ducts, trucks, floors or walls where a chemical resistant coating is required.

ACANAL forms a tough flexible plastic skin that won't oxidize or chemically deteriorate. Where other paints have failed, ACANAL has shown excellent adhesion and resistance to abrasion, fumes and chemical spillage. Non-toxic, won't impart flavors to food or beverages after it has dried.

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THE GARLAND COMPANY

Dept. FE-5 Cleveland 5, Ohio.

J. William Davis, president and owner of Dr. Pepper Bottling Co., Roanoke, Va., has been elected to the board of directors of Dr. Pepper Co.

Ted E. Van de Kamp has been elected vice-president in charge of real estate for Van de Kamp's Holland Dutch Bakeries, Inc.

Roy H. Walters has been named director of research and development for General Foods Corp.

Floyd Wheatley is new president of Mother's Cake & Cookie Co., Oakland, Calif. **Ole Waage** has been named v.-p. and general manager.

Edward B. Woolf has been elected executive v.-p. of Glaser, Crandell & Co., Chicago.

Associated Industries

Ace Carton Corp., Chicago, has named Stanley McGiveran to company first vice-president and also president of its subsidiary, **Ace Folding Box Corp.** at White Pigeon, Mich.

Alto Corp. announces appointment of Abelardo Avila as chief engineer.

American Seal-Kap Corp., Delaware, has purchased **United Can Co., Inc.,** New Village, N. J., and affiliated firms, **United Machine & Design Corp.** and **Hackettstown Paper Tube Co.**

Anchor Hocking Glass Corp., Lancaster, Ohio, has elected W. B. Snell, Jr., and Gordon W. Herrold vice-presidents.

Bakelite Co., Div. of Union Carbide & Carbon Corp., has established a lab for scientific investigation of plastics packaging problems.

Callahan Can Machine Co., Brooklyn, has been sold to **Vermont Marble Co.,** Proctor, Vt.

Cherry-Burrell Corp. has acquired stock interest in **Controls Cells Corp.** of Boulder, Colorado.

Dobeckmun Co., Cleveland, has established a Texas district sales office in Dallas.

Robert Gair Co.'s vice-president in charge of folding cartons div., Norman Greenway, has been elected president of **Folding Paper Box Assn. of America.**

Minneapolis-Honeywell Regulator Co. will construct a new plant at Gardena, Calif., estimated to cost over $1 million.

National Can Corp. has appointed Folke W. Anderson assistant plant manager of its Chicago Kedzie plant.

Neilson Equipment Co. has elected James D. McCampbell president and general manager.

Olin Mathieson Chemical Corp. has appointed Ralph Heller plant manager of its Olin, Ind., cellophane plant.

Owens-Illinois Glass Co. will combine three bottle storage warehouse operations in Los Angeles area into one 220,000 sq. ft. building now under construction.

Package Machinery Co., East Longmeadow, Mass., has named William Maybury, Jr., head of its Cleveland office.

Quaker Rubber Corp., Philadelphia, has appointed Cyril Gamber controller.

Sealright Pacific Co., Los Angeles, has opened a 120,000 sq. ft. plant in Los Angeles.

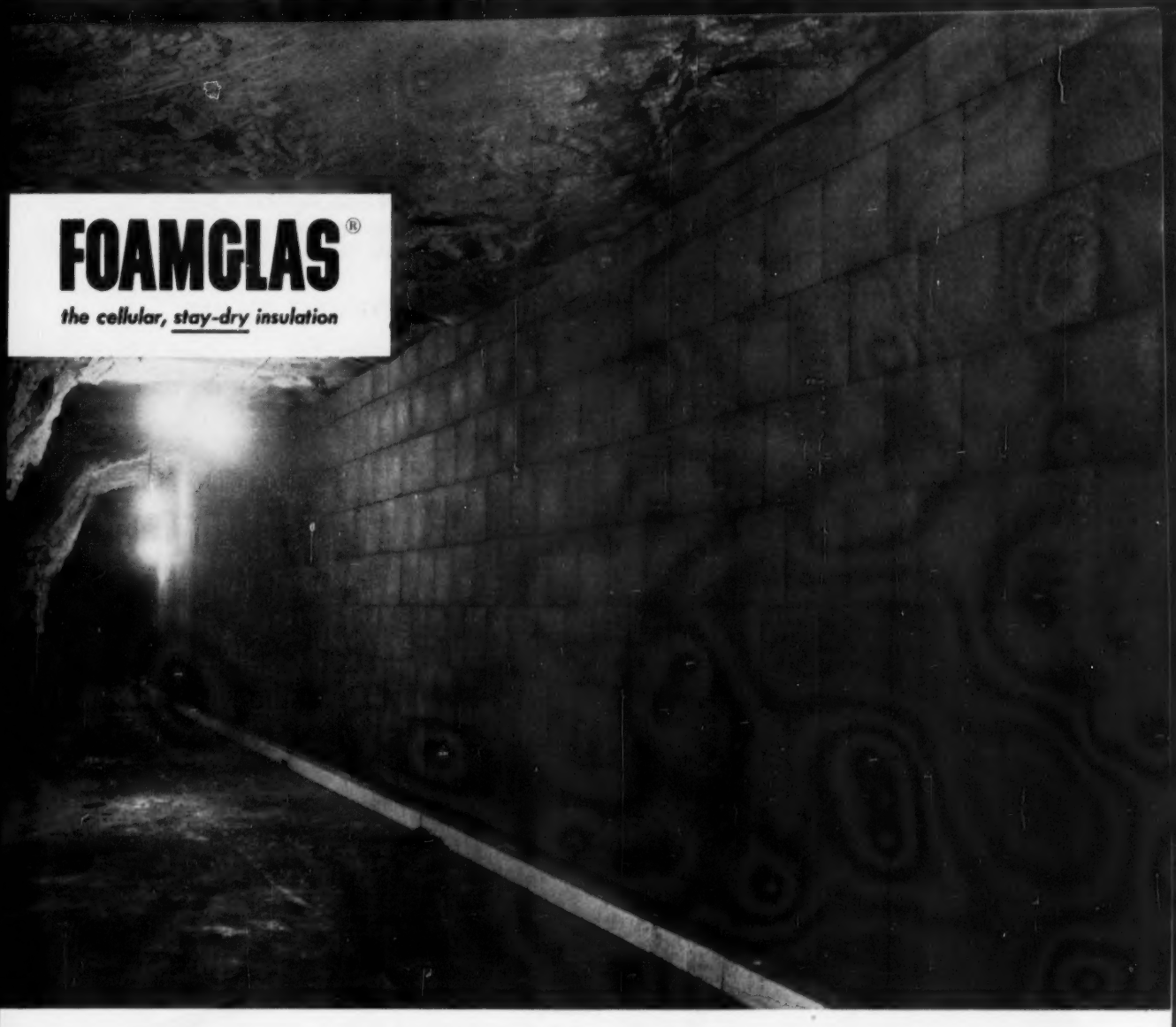
Western Corrugated Box, Inc., has begun construction of a $1 million plant in San Leandro, Calif., expected to be in production by mid-summer.

Deaths

Dr. Edwin J. Cameron, 59, director of National Canners Assn. Research Labs.—Mar. 21. (See p. 116.)

A. M. Chappell, 66, president of Bama Co., Birmingham, Ala. and past president of National Preservers Assn.

Carleton Friday, 57, president of Friday Canning Corp. and Bayfield Canning Co.—Apr. 6.



FOAMGLAS®

the cellular, stay-dry insulation

Underground quarry's 2,500-carload freezers stay dry because FOAMGLAS is moisture-proof

In a nine-acre *underground* limestone quarry below a 175 ft. overburden, Inland Cold Storage Company, Kansas City, Kansas, can store 2,500 carloads of frozen foods! "Our cave was a natural for this," Inland President Leonard H. Strauss points out. "A year-round temperature of 55°F cut in half our costs for refrigeration and construction. With naturally insulated ceilings and floors, only walls were needed to complete our 16 storage rooms.

"We had one tough problem. Although this is a 'dry cave,' on a hot, humid day the relative humidity inside the undeveloped area may reach 85%. But this moist air won't get into any of our freezers or coolers because their walls are insulated with moisture-proof FOAMGLAS. It's the one insulation that'll stay constantly efficient, making refrigeration failure a minor problem. We'd lose only two or three degrees in our zero degree rooms with a complete refrigeration breakdown for two weeks."

You can benefit too from the unique properties of this waterproof, strong, vermin-proof insulation. Please write today for our booklets with complete technical and specification data for cold storage insulation.

Pittsburgh Corning Corporation

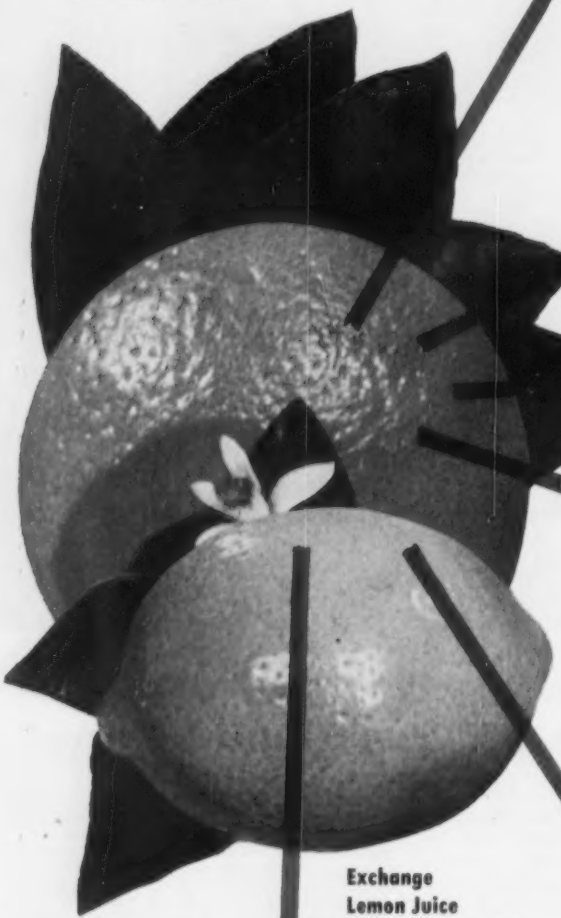
Department O-55, One Gateway Center
Pittsburgh 22, Pennsylvania

In Canada: 57 Bloor St. W., Toronto, Ontario

450,000 bd. ft. of FOAMGLAS was very easy to install... five inches thick on walls between the rooms and six inches, double coursed on perimeter walls. 15,000 ft. of FOAMGLAS pipe insulation was applied later to brine lines held at 24° below zero. General Contractor was Winn-Senter Construction Co., Kansas City, Mo.; Insulation Contractor was Kelly Asbestos Products Co., Kansas City, Mo.

Look to Sunkist
for progressive research in food processing

Yes, in every field of food processing, the Sunkist Growers laboratories are making ever-widening contributions to the increased quality of food products. Here are some typical Exchange Brand product developments.



Exchange Oil of Orange

Always consistent, always outstanding in flavor, strength and aroma. An essence you can rely on. Made from fruit grown in the famous Sunkist groves of California.

Exchange Oil of Lemon

The 4-to-1 favorite over all other lemon oils combined! The reason is the superior flavor that comes only from California-grown lemons processed by exacting Sunkist standards.

Exchange Preserver's Pectin

Here is *even* jell strength that gives you consistent, complete reliability in setting control.

Exchange Low Methoxyl Pectin

A natural fruit pectin that jells without sugar. Completely tasteless, permitting the use of the most delicate flavors. Pies made with Exchange Low Methoxyl Pectin won't "run" or "weep" when cut—and you have never tasted such natural juicy fruit flavor. Famous too for aspics, jellied fruit or vegetable salads, dietetic preserves or non-sugar jells.

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Nothing can match lemon juice for bringing out the natural flavor of *any* food product. It's a superior acidulant in the preparation of mayonnaise, fruit cocktail, figs, fruit nectar, prunes and other heavy-syrup products. Highly effective as an anti-oxidant in processing frozen foods. Citric acid molecules have also been established as effective in the retarding of mold growth. Available in concentrated or single strength form.

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New Catalogs and Bulletins
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PLANT ENGINEERING

Thin-Wall Panels

Concerned with use of Foamglas insulation in thin-wall construction, brochure describes application with different metal, paint, and cement facings. 11 p.—Pittsburgh Corning Corp., Pittsburgh. (225A)

Valve Comparisons

Manual compares various-type valves. 17 p.—Fairbanks Co., 393 Lafayette St., New York City. (225B)

Gear Drives

Complete line of parallel-shaft gear drives pictured with specifications. Book 2619. 32 p.—Link-Belt Co., 307 N. Michigan Ave., Chicago. (225C)

Pneumatic Systems

Comprehensive manual details pneumatic control and transmission systems, and gives practical information for plant operators. Bulletin 1120. 43 p.—Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia. (225D)

Panel Fabrication

New booklet illustrates uses of Marinite panels for building dryers, ovens, and housings. 16 p.—Johns-Manville, 22 E. 40th St., New York City. (225E)

Instrument Transformers

Up-to-date information of complete line of GE instrument transformers for indoor and outdoor use. Fully illustrated with data and prices. GEC-1028, 100 p.—General Electric Co., Schenectady 5, N. Y. (225F)

Oil-Free Air

Compressor data on line having dry, carbon cylinder rings to provide oil-free air.—*Ingersoll-Rand Corp., 11 Broadway, New York City.* (225G)

Centrifugal Pumps

Two bulletins describe performance features of single-phase, double-suction, and two-stage centrifugal pumps.—Bulletin 721.6 & Bulletin 722.6.—*Goulds Pumps, Inc., Seneca Falls, N. Y.* (225H)

Spray Heads

Technical date provided on wide-angle, high pressure spray heads for cooler units.—*Barry-Wehmiller Mach. Co., 4660 W. Florissant Ave., St. Louis.* (225I)

Tubing Valves

Instructions given in new bulletin for soldering and brazing of line of solder-end and socket-end valves installed on copper tubing systems.—*Jenkin Bros., 100 Park Ave., New York City.* (225J)

Ceramic Walls

Folder describes use of ceramic-surfaced insulating block for sanitary wall surfaces.—*Pittsburgh Corning Corp., Pittsburgh.* (225K)

Spray Nozzles

Capacities, dimensions, and applications are detailed for spray nozzles constructed of bronze or steel. Book N-617.—*Yarnall-Waring Co., Philadelphia.* (225L)

Dairy Machinery

Line of dairy machinery described with photos and specifications.—*Creamery Package Mfg. Co. of Canada, Ltd., Toronto, Ontario.* (225M)

DC Motor Line

Illustrated bulletin details performance and specifications for line of dc current motors. Bulletin C-2002, 12 p.—*Reliance Elect. Co., 1088 Ivanhoe Rd., Cleveland.* (225N)

Glass-Lined Tanks

Details given for two types of glass-lined, steel tanks in standard sizes up to 15,000 gal., with light or heavy linings for inert or acid products. Bulletin 916 & 918.—*Pfaudler Co., Rochester, N. Y.* (225O)

Motor Line

Wide line of standard and special motors described and pictured.—*Century Electric Co., 1806 Pine St., St. Louis.* (225P)

Vapor Removal

Steam ejectors feature large volume removal of vapors at high vacuums with low costs. Catalog 1462.—*C. H. Wheeler Mfg. Co., 19th & Lehigh St., Philadelphia.* (225Q)

Turbine Pumps

Available in single, 2-, and 4-stage sizes, pumps are described as having capacity to 150 gpm. at heads up to 150 ft. Bulletins 111, 111A, & 111WJ.—*Aurora Pump Div., N. Y. Air Brake Co., Aurora, Ill.* (225R)

Right-Angle Gearing

Covers engineering facts of compact, right-angle gear units featuring "T" drive arrangement.—*Crown Gear, Worcester, Mass.* (225S)

Refrigerating Medium

Properties and advantages explained in bulletin on use of Freon gas refrigerant.—*E. I. du Pont de Nemours & Co., Wilmington, Del.* (225T)

Fans & Blowers

Booklet details features of fan and blower line handling from 600 to 500,000 cfm. of air.—*Westinghouse Electric Corp., Hyde Park, Boston.* (225U)

Automatic Boilers

With capacities from 15-500 hp., and operating at pressures from 15-250 psi., a line of automatic packaged boilers is specified and pictured.—*Orr & Sembower, Inc., Morgantown Road, Reading, Pa.* (225V)

Can-Making Equipment

Gives details of various can-making units.—*Hamilton Div., BLH Corp., Hamilton, Ohio.* (225W)

Wall Insulation

Features and applications described in literature on Corkboard wall insulation.—*United Cork Co., Central Ave., Kearny, N. J.* (225X)

Packaged Boilers

Illustrated line of packaged boilers in various capacities.—*Ames Iron Works, Inc., Oswego, N. Y.* (225Y)

Dust Recovery

Basic information and machinery illustrated in booklet on dust recovery apparatus. 32 p.—*Western Precipitation Corp., 1036 W. 9 St., Los Angeles.* (225Z)

Electrical Systems

Electrical generation, distribution, and drive systems covered with information on automatic controls.—*GE Co., Schenectady, N. Y.* (225AA)

Axial Flow Fans

Photos, descriptions and specifications of axial flow blowers contained in bulletin 3533-EF.—*Buffalo Forge Co., 159 Mortimer St., Buffalo.* (225AB)

Storage Tanks

Descriptive material on construction of various steel, wood and rubber-covered storage tanks. Bulletin T2-B5, 16 p.—*Denver Equip Co., Denver.* (225AC)

Porcelain Panels

Installation and engineering features given on porcelain locking panels for interior or exterior construction. 11 p.—*Davidson Enamel Products, Inc., Lima, Ohio.* (225AD)

No-Leak Valve

Comic book presentation explains principles behind ring-sealed valve which is said to be leak-proof. 10 p.—*Barksdale Valves, 5125 Alcoa Ave., Los Angeles.* (225AE)

Boiler Blow-Off

Literature contains information on continuous boiler blow-off system featuring high heat recovery and savings in feedwater. Bulletin 5700.—*Cochrane Corp., Philadelphia.* (225AF)

Fire-Fighting

Line of fire-fighting pump units from stationary models to self-propelled vehicles. Features fog-type spray nozzles. 16 p.—*John Bean Div., FMC Corp., Lansing, Mich.* (225AG)

Sight Flow Glasses

For ¼ to 2 in. product lines, line of sight flow indicators is pictured in reflex, and transparent one and two window models.—*Jerguson Gage & Valve Co., 80 Fellsway, Somerville, Mass.* (225AH)

Speed Reducers

Description and photos of narrow unit complete with adjustable motor mount. Variable speed by changing pulleys. 5 p.—*U. S. Expansion Bolt Co., New Standard Div., York, Pa.* (225AI)

Space Cooler

Brochure details 2-ton unit air conditioner for eliminating hot-spots in plant areas. 3 p.—*Simplaire Co, 521 5th Ave., New York City.* (225AJ)

Remote Valve Control

Manual contains data and engineering design for reach rods, flexible shafting, and geared joints used in remote control of valves. Bulletin 553, 20 p.—*Stow Mfg. Co., Binghamton, N. Y.* (225AK)

Cooling Towers

Contains specifications for line of low-silhouette, induced draft cooling towers for roof installation. Air conditioning and small industrial applications. 4 p.—*J. F. Pritchard & Co., 4625 Roanoke Parkway, Kansas City, Mo.* (225AL)

Aluminum Applications

Booklet treats of role aluminum plays in the processing industry. 8 p.—*Aluminum Co. of America, Pittsburgh.* (225AM)

Vertical Pumps

Covers two types of vertical, self-priming, centrifugal pumps, which operate either under flooded or lift suction. Bulletin G-1, 12 p.—*LaBour Co., Inc., Elkhart, Ind.* (225AN)

Ideal for Dairy and Food Industries

The Strahman Spray Nozzle does a better job with the least amount of water. This precision made nozzle enables the operator to get any type stream of water to do his job by simply pressing the lever. A soft spray is sent forth with slight pressure on the lever, and a strong straight stream may be had by pushing the lever all the way down. This convenient control of the wash water assures better cleaning with a lot less effort. The nozzle automatically shuts off the moment the lever is released, thereby eliminating all waste of water.

RENEWABLE RUBBER COVER. The sturdy cover protects the nozzle and your equipment against knocks and dents. When the cover becomes worn, replace it with a new one.

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TECHNICAL COATINGS SINCE 1895

Automatic Valves

Relates features of valve line specializing in pressure, temperature, and combination pressure and temperature control valves. Form 5417, 4 p.—*C. E. Squires Co., 18502 Syracuse Ave., Cleveland. (226A)*

Insulated Piping

Tabbed sections in new catalog divide engineering, product, specs., drawings, and installation information on line of insulated piping for overhead or underground use. 90 p.—*Ric-Wil, Inc., Barberton, Ohio. (226B)*

Heat-Exchangers

Six new bulletins describe latent heat storage systems, refrigerant transfer pumps, coils, compressors, and a chip-ice machine. Bulletins 416, 424, 425, 427, 428, 429.—*Vilter Mfg. Co., Milwaukee. (226C)*

Double-Suction Pumps

Brochure pictures working parts of double suction centrifugals featured in five sizes: 3×2½ in., 150 ft. head, to 6×6 in., 100 ft. head. Ask for Type KS—08B8233. 4 p.—*Allis-Chalmers Mfg. Co., Milwaukee. (226D)*

Air Dehydrator

Details of unit designed for dehydrating compressed air supplies to instruments and dead-end installations. Bulletin C-5154—*Hankison Corp., 951 Banksville Rd., Pittsburgh. (226E)*

Hot-Cold Insulation

Check list details types and specifications of different insulating materials for covering cement, blocks, and pipes. Data covers hot or cold radiating installations. 4 p.—*Mundet Cork Corp., 7101 Tonnelle Ave., N. Bergen, N. J. (226F)*

INSTRUMENTS

Electronic Control

Step by step explanations of Spectracord's electronic recording and control systems with circuit diagrams. Booklet FS-245. 20 p.—*Fisher Scientific, 717 Forbes St., Pittsburgh 19. (226G)*

Weighing Guide

New methods and new equipment applications for weighing, blending, or proportioning of materials suggested in new guide. Bulletin 0450.—*Richardson Scale Co., Clifton, N. J. (226H)*

Control Center

All switching and control operations possible from one location with compact control center.—*General Electric Co., Distribution Assemblies Dept., Plainville, Conn. (226I)*

Controllers

File sheets give key data on recorders and electronic controllers, with photos, drawings, and dimensions. Sheets ND46-33 (100 to 104).—*Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia. (226J)*

Temperature Recorders

Story on installation, ranges, charts, bulbs, and tubing for vapor-pressure temperature recorders. Bulletin T840, 48 p.—*Bristol Co., Waterbury 20, Conn. (226K)*

Flow Controller

Illustrated bulletin covers features and gives data on full-vision rotameters for measurement and control of liquid flow. Bulletin 115, 20 p.—*Brooks Rotameter Co., Lansdale, Pa. (226L)*

Recorder Catalog

Catalog treats of many styles of temperature recorders and indicators.—*Electric Auto-Lite Co., Instrument & Gauge Div., Toledo, Ohio. (226M)*

Liquid Meter

Description of instrument on which desired amount of liquid may be set on a dial, whereupon meter delivers automatically. Capacities from 1 to 1,000 gpm.—*Buffalo Meter Co., Buffalo, N. Y. (226N)*

Air Relays

Line of air relays performing representative functions of air volume amplifying, pressure reversing, retarding, advancing and averaging, differential controlling, and minimum pressure controlling. Brochure 359. 2 p.—*Powers Regulator Co., Skokie, Ill. (226O)*

Proportioning

Remote control by electronics of formulation and blending is described and illustrated with engineering drawings. Bulletin 0351, 28 p.—*Richardson Scale Co., Van Houten Ave., Clifton, N. J. (226P)*

Electric Controls

Floatless liquid-level controls and other electrical equipment covered in catalog.—*B/W Controller Corp., Birmingham, Mich. (226Q)*

Electronic Weigher

Machine checks every package, rejecting over-weights and under-weights into separate groups.—*Exact Weight Scale Co., 910 W. 5th Ave., Columbus, Ohio. (226R)*

Boiler Control

Design and operating facts, with illustration, on new feed water control which can also serve as low water alarm and burner switch. Twin-switch and float-operated unit utilizes magnetic controls. Bulletin L-119, 4 p.—*McDonnel & Miller, Inc., 3500 N. Spaulding Ave., Chicago. (226S)*

Feeding Devices

Proportioning and feeding of small quantities listed in line of pump-instrument combinations. Each pictured item refers to a separate bulletin.—*BIF Industries, P.O. Box 1342, Providence. (227A)*

Automatic Control

Unit that will automatically operate retorts described. Information on temperature, venting, and cooling is dialed into unit, which duplicates cycle exactly.—*Foxboro Co., Foxboro, Mass. (227B)*

MAINTENANCE

Casters and Wheels

Different types of swivel and fixed casters, with steel or rubber treads listed in manual.—*Darnell Corp., Ltd., 60 Walker St., N.Y.C. (227C)*

Titanium Alloys

New periodical lists uses and technical data on titanium alloys for replacement parts.—*Rem-Cru Titanium, Inc., Midland, Pa. (227D)*

Plant Lubricants

Data book gives lubricating tips and information.—*Lubriplate Div., Fiske Bros. Refining Co., Newark, N. J. (227E)*

Prevents Condensation

Handbook shows how to apply plastic coating over metal, concrete, brick or plastic to prevent condensation and drips.—*J. W. Mortell Co., Burch St., Kankakee, Ill. 227F)*

Colored Tape Uses

Identification of pipe lines and aisle marking, two uses given among many for a line of plastic colored tapes.—*Minnesota Mining & Mfg. Co., St. Paul, Minn. (227G)*

Odorless Enamel

Covers applications and properties of odorless paint containing a fungicide said to retard mildewing.—*E. I. du Pont de Nemours & Co., Wilmington, Del. (227H)*

New Alloy Electrode

For use on aluminum-nickel-bronze alloy castings, new electrode is described as available in bare and flux-covered types for tungsten-arc and carbon-arc welding. Bulletin 54L-148, 2 p.—*Ampco Metal, Inc., 1745 S. 38th St., Milwaukee. (227I)*

Helical Gear Sets

Engineering manual details line of helical gear sets with additional information on space-saving arrangements and maintenance tips. Manual DR-2, 30 p.—*Foote Bros. Gear & Mach. Corp., 4545 S. Western Blvd., Chicago. (227J)*

Compressed Air Losses

Folder points up losses in compressed air systems. Details methods for checking on losses and diagrams high-efficiency systems. Form 213-A, 6 p.—*Ingersoll-Rand Co., 11 Broadway, New York City. (227K)*

Portable Test Unit

A series of test units are detailed for use in calibrating electrical protective devices such as circuit breakers, fuse links, and overload relays. Data Sheet 55, 4 p.—*Multi-Amp Corp., 10 3rd St., Newark, N. J. (227L)*

Silicone-Aluminum Paint

Brochure describes application of aluminum-silicone paint to hot metal surfaces. 1 p.—*C. H. Draggert Co., P. O. Box 5092-L, Dallas, Texas. (227M)*

Bulk Plastics

Gives details for use of bulk sheet, rod, and tube plastics in fabricating. Also, depicts line of laminated and molded plastic parts, such as gears, gaskets, and bearings. 12 p.—*Richardson Co., 2739 Lake St., Melrose Park, Ill. (227N)*

Portable Pump Units

Illustrated folder pictures 3 portable pumps, one gas-powered and 2 electric-drive, ranging in capacity from 7-14 gpm. for setting up temporary pumping stations. 4 p.—*Eastman Pacific Co., 2320 E. 8th St., Los Angeles. (227O)*

AC, DC Relay Line

Engineering and electrical data plus illustrations and dimensional drawings cover wide line of AC and DC relays and switches. 72 p.—*Guardian Electric Mfg. Co., 1621 W. Walnut St., Chicago. (227P)*

Shelves & Cabinets

General line of steel shelving, cabinets and accessories pictured and described. 24 p.—*Precision Equipment Co., Chicago. (227Q)*

Solder-Putty

Brochure informs on solder, available as a putty or liquid, which can be applied with putty-knife or spray gun. Substance drys hard in minutes and can be machined or sanded to a knife-edge. 4 p.—*A. L. Okun Co., 109 Van Wyck Expressway, Long Island. (227R)*

Machine Mounts

Considers features of two types of machine mounts. Regular leveling mount for normal use and spring-mounted feet for vibration control. Bulletin 546, 8 p.—*Barry Controls, Inc., 1000 Pleasant St., Watertown, Mass. (227S)*

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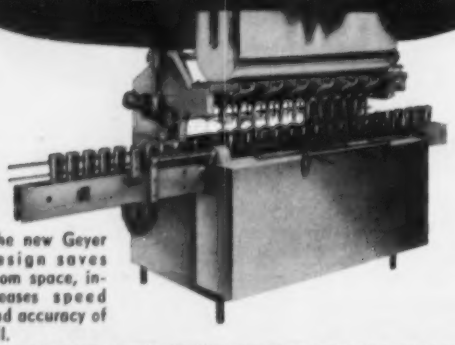

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Belt, roller, slat, and push-bar conveyors facts contained in catalog.—*Standard Conveyor Co., North St. Paul, Minn. (228A)*

Wire Mesh Belts

Line of metal mesh belts covered in manual, with complete specifications on design, mesh size and alloys. 130 p.—*Cambridge Wire Cloth Co., Cambridge, Md. (228B)*

Conveyor Belts

Photos and descriptions tell the story of this line of wire mesh belts. Catalog 5.—*Cyclone Fence, Waukegan, Ill. (228C)*

Bulk Handling

Illustrated data on aluminum bins for portable storage of bulk materials.—*Tote System, Inc., Beatrice, Neb. (228D)*

Tractor-Shovel

Considers advantages and specifications of 7 models of tractors equipped with shovels for bulk handling of materials.—*Frank G. Hough Co., Libertyville, Ill. (228E)*

Tubular Frame Conveyors

Standard line of tubular frame conveyors for long transportation of bulk materials. Bulletin SF-1, 8 p.—*E. F. Marsh Engineering Co., St. Louis. (228F)*

Fork Truck Attachment

Drum-carrying attachment for fork trucks detailed in pictures and specifications. 4 p.—*Big Joe Mfg. Co., 904 W. Jackson Blvd., Chicago. (228G)*

Fork Truck

Improved 2-ton fork lift pictured, with dimensions and working data. Model Y-40.—*Truck-Man Div., Knickerbocker Co., 584 Liberty St., Jackson, Mich. (228H)*

Monorails

Comprehensive coverage of types of monorail installations, with illustrations from industry. Bulletin C-1, 56 p.—*American Monorail Co., Athens & Halstead Ave., Cleveland. (228I)*

Refinery Items

Line of sugar refinery equipment, with special emphasis on bulk handling equipment and conveyors.—*Jeffrey Mfg. Co., Columbus, Ohio. (228J)*

Wire Belts

Photos, information, and specifications for belts made of carbon, alloy, and stainless steels. Catalog 5.—*U. S. Steel Co., Cyclone Fence Div., Waukegan, Ill. (228K)*

Conveyor Components

Descriptive material on tension-end and drive-end components, available in standard designs to fit wide variety of conveyor applications. Bulletin 201.—*Sandvik Steel, Inc., 111 8 Ave., New York City. (228L)*

Extending Forks

Two models of an electric fork truck with extending forks detailed. Reach-type forks facilitate close-aisle work. 4 p.—*Yale & Towne Mfg. Co., Philadelphia. (228M)*

Floor Trucks

Line of two-wheel, shelf and tray, box, and wagon trucks, together with skids and dollies for commercial use. 64 p. Catalog 100.—*Hamilton Caster & Mfg. Co., 1700 Dixie Highway, Hamilton, Ohio. (228N)*

LP Gas Trucks

Brochure refers to liquified petroleum power systems for fork trucks. Line drawings illustrate carburetion. 4 p.—*Clark Equipment Co., Battle Creek, Mich. (228O)*

PROCESSING

Flotation Cleaner

For use in cleaning peas, lima beans or adaptable for whole kernel corn—bulletin describes froth flotation process.—*Food Machinery Corp., Hoopeston, Ill. (228P)*

Batch Mixers

Wide line of propeller, turbine, and paddle mixers. Both portable and fixed equipment detailed. Installation and operating hints given.—*Mixing Equipment Co., 143 Mt. Read Blvd., Rochester, N. Y. (228Q)*

Ice Maker

Available in capacities from ½ to 40 tons of shell-ice per 24-hr. Ice maker facts and pictures. Bulletin 54.—*Frick Co., Waynesboro, Pa. (228R)*

Tray Drier-Cooler

Facts about multi-level tray drier, heater, or cooler, explained. Unit features small floor space. 8 p.—*J. W. Greer Co., Wilmington, Mass. (228S)*

Flour Sifter

Described machine sifts flour and transfers it to dough-mixers by air pressure, automatically. Spec. Sheet B-105RA.—*J. H. Day Co., 1151 Harrison Ave., Cincinnati. (228T)*

Cap Feeding & Turning

Details of a capfeeding device coupled with a neoprene mounted, cap-turning chuck for handling screw-on closures. Bulletin 128.—*Pneumatic Scale Corp. Ltd., 82 Newport Ave., Quincy, Mass. (228U)*

Processing Machinery

Wide line of processing equipment from apples to tomatoes featured in this catalog. Plus operating and maintenance supplies. —*A. K. Robbins & Co., Inc., 713-729 E. Lombard St., Baltimore.* (229A)

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PACKAGING

Packaging Study

How to eliminate packaging problems explained by packaging engineer during free survey.—*Hoerner Boxes, Inc., 50 E. 42 St., New York City.* (229C)

Large-Size Cartons

Information on use of large cartons for packaging of bulk items.—*Gaylord Container Corp., St. Louis.* (229D)

Resin-Base Adhesives

Applications of resin-based adhesives for case sealing.—*Swift & Co., 4115 Packers Ave., Chicago.* (229E)

Foil Container

Characteristics of a foil, pot-pie pan for use in packaging fruit and meat pies discussed.—*Cochran Foil Co., Inc., PO Box 1466, Louisville, Ky.* 229F)

Case Sealer

Information on case sealer and compression unit featuring minimum space requirement.—*Standard-Knapp Div., Emhart Mfg. Co., Portland, Conn.* (229G)

Can Ejector Unit

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Operating data on packager which forms, fills, and seals from 40-150 units per minute. Uses any heat-seal material or laminate and handles solid, semi-liquid, and liquid products.—*Hayssen Mfg. Co., Chicago, Ill.* (229I)

Unit Packager

Featuring operating speed of 500 cans per min., machine will package from two to six cans in cardboard carrier.—Gardner Board & Carton Co., Middletown, Ohio. (229J)

Adjustable Cartons

Features of new modular packaging cartons explained. Basic units are adapted for different-size products.—Signode Steel Strapping Co., 2600 N. Western Ave., Chicago. (229K)

INGREDIENTS

Non-Calory Sweetening

Relates characteristics of a synthetic sweetening substance.—*Abbott Laboratories, Chem Sales Div., North Chicago.* (229L)

Citric Acid

Description of citric acid properties. Uses in hydrogenated oils told. Bulletin 72.—*Chas. Pfizer & Co., 630 Flushing Ave., Brooklyn.* (229M)

Starch Enzymes

Technical discussion of the use of diastatic enzymes for the processing of starch in foods.—*Rohm & Haas Co., Washington Sq., Philadelphia.* (229N)

Pickle Spices

Flavor data sheets list characteristics of a line of pickle spices. —*Fritzsche Bros., Inc., 76 9th Ave., New York City.* (229O)

Flavor Samples

Information on various food flavors. Samples available. — Norda, Inc., 601 W. 26th St., New York City. (229P)

Silicone Defoamer

Samples available of silicone defoamer, a few ppm. of which eliminates boil-overs.—Dow Corning Corp., Midland, Mich. (229Q)

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Test reports available indicating increased flavor retention in frozen foods through the use of MSG.—*Huron Milling Co., 9 Park Place, New York City.* (229R)

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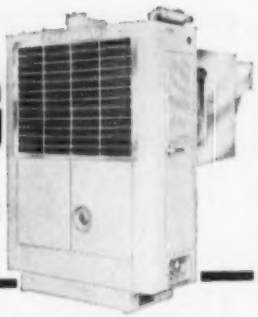

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(Continued from preceding page)

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Effective with the July issue, a new section will start in FOOD ENGINEERING. We will head this section: EMPLOYMENT OPPORTUNITIES. All Displayed Employment Opportunity advertising will be placed in this new section, with the exception of those advertisers who contract for run-of-book position. New Advertisers will be billed at the transient rate of $18.00 per inch, unless on contract. Contract rates furnished on request. Advertisements are subject to Agency Commission.

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All of the equipment is being disposed of immediately, individual items or in lots. Sacrifice prices have been established. More than $1,000,000.00 was spent in new equipment in 1948. Included is a brand new bottlehouse, new A. O. Smith tanks, a new can line used less than one year, new lauter tub, new malt mill, new hop strainer . . . Now, everything must go.

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58—Cypress tanks totaling 209,560 gals. from 4185-6200 gallons each.
75—Oak tanks totaling 445,000 gallons, from 4960-6975 gallons each.

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Complete Davenport rotary steam tube dryer installation, new 1950; dryer 6' dia. by 35' long; 54-4" steam tubes, 125 p.s.i., having a cap of 1000 lbs. dry grain per hour, 7½ HP drive, with grain tanks, #3A press, vapor stack, expansion chambers, etc.

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AIR COMPRESSOR

Hassenberg 7 x 6 M2 air compressor, installed new 1948, water cooled and water lubricated, with 20 HP G.E. motor.

FILTERS

3—Klein and Kiefer stainless steel pulp filters with screens, fittings, hydraulic presses, etc.
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BOILERS

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York 11½ x 10 ammonia compressor, 108 tons refrigeration cap., with 175 HP, 360 RPM, 220 volt, 60 cycle, 3-phase motor, installed new January 1949.
35—Pumps ranging 5-50 HP.

Thousands of other items including copper brewkettle, 10,000-gal cap., steam-jacketed; hot and cold water tanks; thousands of feet of ammonia pipe, copper pipe; AC and DC motors; Alvey conveyor; pumps, conveyors; gauges; lift trucks; coolers; heat exchangers; copper attemperator coils—more than one million dollars of new equipment installed in 1948!

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3083 MAIN ST - BUFFALO 14, N. Y. - AMHERST 2100

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Colloid: Charlotte 3 hp., Premier 3 hp.
Hammer: Mikro 1SH, 2DH, 2TH, Gump #1, Prater, Raymond, Jay Bee, Jeffrey 30 x 24", Williams #2 and BX. Fitzpatrick Homoloid model J.
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Portable electric: ¼ to 5 hp.
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330 W. 42 St., New York 36, N. Y.

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10—Ribbon Mixers 200 to 4000# Cap.
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1—Stokes DD-2 Rotary Tablet Machine
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6—Sweetland Filters #3, #5, #7, #10, #12.
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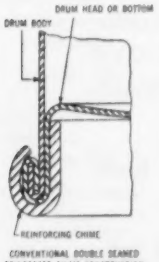

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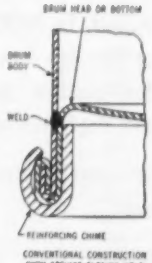

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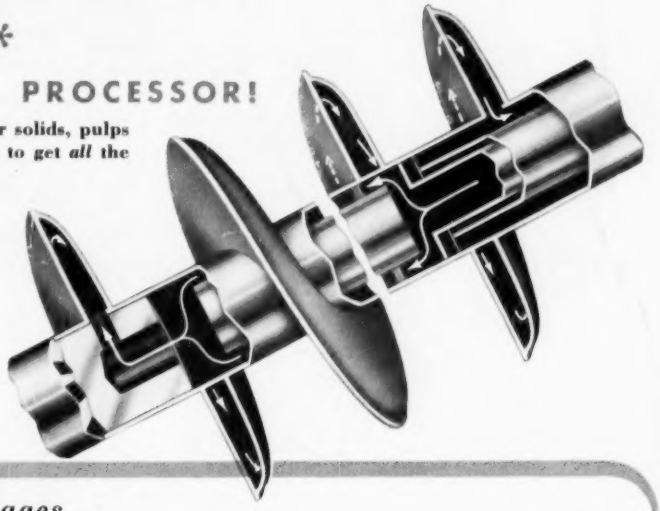

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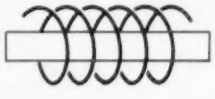

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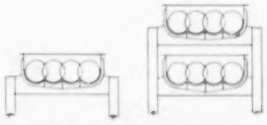

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